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No. 14

NIAGARA RIVER DAM.

The project of a dam at the outlet of Lake Erie to raise the level of the lakes, which has been discussed off and on for years and which has been made the subject of investigation by deep waterways commissions, is not, indeed, such an intangible enterprise as many have believed. While Mr. Burton, the chairman of the committee on rivers and harbors, is reluctant to be directly quoted upon the subject, he has gone so far as to say that he considers the movement well advanced and that it has been thoroughly considered by the interests that will have to do with its development. It would not be surprising if construction work were to begin within two or three years. The war department has quietly made a full investigation of the subject through its engineers and has decided in its favor. In fact much of the preliminary work necessary to bring about an international agreement upon the subject has been done. The enterprise is, of course, intimately international. It affects Canada as well as the United States. As individual owners of property fronting on the shore of the lakes have rights which embrace both high and low water stages, the question of damage is involved in any alteration of the levels, but this, however, is not regarded as at all serious, the authorities concluding that it is one which can be easily adjusted. The point of greatest interest is that the authorities have practically all agreed that a dam is necessary to preserve the level of the lakes. The question bears close relationship to power and drainage canals and other works which have altered and diverted the natural volume and flow of the waters of the lakes. A chart which the Marine Review recently published conclusively proved that the stages of water in the lower lakes have steadily become lower during recent years while the stage of water in Lake Superior has become higher. The present river and harbor bill devotes an entire section to this subject as follows:

"That the president of the United States is hereby authorized to invite the government of Great Britain to join in the formation of an international commission to be composed of three members from the United States and three who shall represent the interests of the dominion of Canada, whose duty it shall be to investigate and report upon the conditions and uses of the waters adjacent to the boundary lines between the United States and Canada, including all of the waters of the lakes and rivers whose natural outlet is by the river St. Lawrence to the Atlantic ocean; also upon the maintenance and regulation of suitable levels; and also upon the effect upon the shores of these waters and the structures thereon, and upon the interests of navigation by reason of the diversion of these waters from or change in their natural flow; and further, to report upon the necessary measures to regulate such diversion, and to make such recommendations for improvements and regulations as shall best subserve the interests of navigation in said waters. The said commissioners shall report upon the advisability of locating a dam at the outlet of Lake Erie, with a view to determining whether such dam will benefit navigation, and if such structure is deemed advisable, shall make recommendations to their respective governments looking to an agreement or treaty which shall provide for the construction of the same, and they shall make an estimate of the probable cost thereof. The president, in selecting the three members of said commission who shall represent the United States, is authorized to appoint one officer of the corps of engineers of the United States army, one civil engineer well versed in the hydraulics of the great lakes, and one lawyer of experience in questions of international and riparian law, and said commission shall be authorized to employ such persons as it may deem needful in the performance of the duties hereby imposed; and for the purpose of paying the expenses and salaries of said commission the secretary of war is authorized to expend from the amounts heretofore appropriated for the St. Mary's river at the falls, the sum of \$20,000, or as much thereof as may be necessary to pay that portion of the expenses of said commission chargeable to the United States."

It is understood that the Canadian authorities are just as desirous as the United States of definitely determining these points. Tangible results may, therefore, be expected within a reasonable length of time.

VESSEL CONSTRUCTION DURING NINE MONTHS.

Returns to the bureau of navigation show that during the first nine months of the current fiscal year, ended March 31, 1902, there were built in the United States and officially numbered 949 vessels of 245,068 gross tons. For the corresponding period of the previous fiscal year the figures were 753 vessels of 246,973 gross tons. These figures do not include canal boats and unrigged barges. A gain of about 8,000 tons on the Atlantic seaboard is offset by losses of about 5,000 tons on the lakes, 3,000 tons on the Pacific and 2,000 tons on western rivers. Of the nine months' construction only fifty-seven vessels are over 1,000 gross tons each, aggregating, however, 169,566 tons, or 70 per cent. of the total tonnage.

Of the large vessels the great lakes have built twenty-two steel steamers of 84,323 tons. Two of these, Watson and Buckman of 1,820 tons each, are banana steamers for West Indian trade; one, Hugoma of 2,182 tons, is for the Porto Rican trade; and one, Minnetonka of 5,270 tons, is to be cut in two to pass the Canadian canals and then rejoined for ocean trade. The seaboard has built ten steel steamers of 41,204 tons, of which the largest is Korea, 11,276 tons, a Pacific Mail steamer for trade from San Francisco via Honolulu to Hongkong, with possible extension to the Philippines; one, Nevada, 4,408 tons, is for the New York-Hawaiian trade; one, Pathfinder, 2,792 tons, is for the Porto Rican trade; one, J. M. Guffey, 2,520 tons, is for the Texas petroleum trade. The others are for the usual coasting trades.

Large schooners number nineteen, of 32,757 tons, all wooden except Providence, 1,651 tons, built of steel at Camden, N. J. Six square-rigged vessels include the two Bath-built steel ships, William P. Frye and Atlas, and four wooden barkentines built on the Pacific, in all 11,282 tons. The advanced construction of vessels launched or soon to be launched indi-

cates that the total construction for the year will somewhat exceed that of the fiscal year 1901. Contracts for new work are, however, less than a year ago.

Following is the table of construction for the past nine months, divided into districts, and a corresponding table for nine months of the preceding year:

MERCHANT VESSELS BUILT IN THE UNITED STATES DURING NINE MONTHS ENDED MARCH 31, 1902.

	WOOD.				STEEL.				TOTAL.	
	SAIL.		STEAM.		SAIL.		STEAM.			
	No.	Gross tons.	No.	Gross tons.	No.	Gross tons.	No.	Gross tons.	No.	Gross tons.
Atlantic and gulf	453	51,449	183	12,858	5	8,869	39	58,724	680	131,900
Porto Rico.....	2	34							2	34
Pacific.....	37	21,254	44	5,488			1	2,036	82	28,778
Hawaii.....			1	13					1	13
Great lakes.....	6	161	45	2,033			25	75,810	76	78,004
Western rivers.....	6	114	99	6,040			3	185	108	6,339
Total.....	504	73,012	372	26,432	5	8,869	68	136,755	949	245,068

MERCHANT VESSELS BUILT IN THE UNITED STATES DURING NINE MONTHS ENDED MARCH 31, 1901.

	WOOD.				STEEL.				TOTAL.	
	SAIL.		STEAM.		SAIL.		STEAM.			
	No.	Gross tons.	No.	Gross tons.	No.	Gross tons.	No.	Gross tons.	No.	Gross tons.
Atlantic and gulf.....	328	58,754	123	7,566	7	10,012	26	47,747	484	124,079
Porto Rico.....										
Pacific.....	35	18,296	44	7,196			4	6,030	83	31,522
Hawaii.....										
Great lakes.....	5	108	30	2,551	3	6,678	25	74,030	63	83,367
Western rivers.....	46	847	76	6,596			1	562	123	8,005
Total.....	414	78,005	273	23,909	10	16,690	56	128,369	753	46,973

SUNDRY CIVIL BILL.

The sundry civil bill which has been reported to the house of representatives carries the following appropriations, of interest to the lakes: Continuing harbor improvements at Cleveland, \$107,000; at Toledo, \$223,000; at Lorain, \$300,000; at Ashtabula, \$200,000. The most important separate item is an appropriation of \$150,000 for investigation regarding lake levels and for resurveying and printing charts of the great lakes. Gen. Gillespie, chief of engineers, makes a specific recommendation of this item, saying that the greatly increased draught of vessels make it imperative that many localities should be resurveyed. He also says that the investigation of lake levels with respect to changes, due to natural and artificial causes, should be prosecuted with vigor.

Other items are as follows: Continuing improvements heretofore authorized along Detroit river and in excess of amount carried in rivers and harbors bill, \$136,500; continuing improvements on Hay lake channel, heretofore authorized and in excess of amount carried in rivers and harbors bill, \$144,115; range lights on channels where they cannot be maintained from American shore, \$4,000; establishing light and fog signal station at St. Marys island, entrance Green bay, \$14,000; completion of a steam tender for buoy supply and inspection service in the ninth district, \$30,000; completion of new steam tender for construction and repair service in the ninth district, \$65,000; for completion of light and fog signal station to mark outer end of the main channel of Toledo harbor, \$10,000; for the completion of one revenue cutter of the third class for use on St. Marys river, \$37,500.

The lake freight market is just as it has been for a long time past. Shippers have secured some vessels to carry ore throughout the season at 75 cents from the head of the lakes to Lake Erie ports, but the leading individual owners—Messrs. Gilchrist, Mitchell and others—are still holding out for 80 cents. Some coal to go to Duluth has been covered by season contracts at 35 cents and more vessels could be had at that figure, but the coal shippers are trying to cover their Lake Michigan coal at 45 cents and are delaying Lake Superior business on that account. The vessel men are asking 50 cents on season contracts to Lake Michigan. The longshoremen employed on Lake Erie coal and ore docks have entered into the usual contract with the dock managers and the only labor difficulty now on hand is that with the tugmen. It is not expected, however, that the tugmen's strike will be of long duration.

Messrs. Hawthorne & Leslie, Newcastle-on-Tyne, have received orders from the admiralty for the construction of two torpedo boat destroyers, one to be fitted with reciprocating engines and the other with turbines. In addition to the recent orders for three fast cruisers the admiralty has placed orders with Clyde ship building firms for a battleship of 16,530 tons, with a speed of 18½ knots, and a first-class cruiser. The orders thus far placed with Clyde builders amount in value to £3,250,000. The Laird and Armstrong companies will each build a third-class cruiser.

It is expected that the Welland canal will open April 21. The Cornwall and Lachine canals will open on May 1.

PROPOSED GREAT FRENCH SHIP-CANAL.

The French parliamentary committee on maritime affairs, to which the chamber of deputies referred the bill for the proposed ship-canal across Southwestern France from the Atlantic to the Mediterranean, has concluded its labors, and the chairman of the committee, M. Honore Leygues, has submitted to the chamber a solid, voluminous report, bristling with figures, statistics, maps, plans and projections urging the immediate construction of the canal for strategical as well as commercial reasons. The scheme seems chimerical, but the French are viewing it seriously. They maintain that it would destroy the importance of Gibraltar and enable the French Mediterranean and channel fleets to concentrate at will at either terminus of the canal. The terminal points recommended are Arcachon, on the Atlantic seaboard, and Narbonne, in the Mediterranean. Arcachon and Narbonne are to be transformed into strongly fortified naval ports with arsenals and dockyards. Each port is to be large enough to accommodate the whole French navy.

The canal is to be 280 miles long. The total cost is estimated at \$263,000,000, exclusive of naval constructions and fortifications, or \$305,000,000 if the twenty-seven locks are to be fitted with Archimedes elevators of the type adopted at Henrichsburg, which enable vessels of 1,000 tons to be lifted to a height of 50 ft. The estimate of the expense of construction is based upon the cost of the Manchester canal and the Kiel canal, with due allowances for greater number of locks, greater depth, greater width and greater volume of water.

It is found that the tonnage of vessels that passed through the straits of Gibraltar bound for ports in northwestern Europe or in the Mediterranean, or vice versa, during the year 1900 amounted to 50,000,000 tons. The local coasting traffic is put at 6,000,000 tons. The committee, in order not to appear too optimistic, has taken for its estimate half of these figures; that is to say, 25,000,000 tons for ocean traffic and 3,000,000 for coasting.

the canal, including the 11 hours 42 minutes' delay at the locks, in 42 hours 6 minutes. The minimum cost of coal for a vessel proceeding at 8 knots is calculated at 15 cents a ton per day. That is to say, a vessel of 3,000 tons proceeding at 8 knots would consume \$1,131 worth of coal during a voyage of 2 days 15 hours, which is the minimum time saved during the route between the two ports—Hamburg and Port Said—which is the one where there is the least to be gained by a passage through the proposed canal. The same vessel of 3,000 tons would pay in canal tolls at the rate of 35 cents per ton, \$1,050. This would effect a saving in coal consumption of \$81, besides shortening the voyage by 2 days 15 hours.

The conclusions of the report are that all vessels plying between the Mediterranean and ports of northwestern Europe—and the tonnage of steamers passing to and from these points during the year 1900 amounted to 50,000,000 tons—will find it advantageous to make use of the proposed ship-canal. Admiral Fournier, one of the highest naval authorities in France, has drawn up an elaborate report on the proposed canal judged from a strategical point of view. In this report Admiral Fournier cites from a speech made in the house of commons by Sir Charles Dilke the following passage: "In the event of a great war the whole of Africa, including Egypt and Algeria, would fall to the power that has command of the sea." Admiral Fournier explains and develops this text; he also refers to conclusions drawn from Capt. Mahan's work on "The Influence of Sea Power Upon the French Revolution and Empire," and shows how the French fleet is practically cut in twain by the strategical predominance of Gibraltar, which enables England, in case of war, to pen up half of the French fleet in the Mediterranean and attack the other half with overwhelming force in the channel. Admiral Fournier has come forth as the naval champion of the proposed ship-canal, which he declares to be a military necessity for France. M. Leygues, chairman of the parliamentary committee on maritime affairs, has announced his intention of asking the



Forty-two large steel ships have been laid up during the winter at the ship yard of the American Ship Building Co. at West Superior, Wis. Most of these belong to the Pittsburg Steamship Co., the lake branch of the Steel Corporation, and all are now about ready for business. The ore boats will start out very soon, for the upper lake harbors are open and ore hauling to dock has already commenced in a small way. It will be general in another week. A large amount of money has been spent in repairs and outfitting for these ships at the head of the lakes, not only on vessels at the ship yard, but also on vessels of the Northern Steamship Co., the Davidson fleet and others that have wintered at Superior and Duluth. The biggest repair job has been on the Pittsburg company's barge Smeaton, which went ashore last fall at Au Train, and which has been in dry dock all winter, undergoing what is pretty nearly a complete rebuilding of her outside bottom. The greatest care has been exercised during the winter to prevent fire among these ships, by complete alarm systems and by numerous watchmen, and though fire has actually broken out twice on board the vessels it has done almost no damage.

This gives a minimum traffic for the canal of 28,000,000 tons. The committee proposes to fix the canal tolls at the uniform rate of 35 cents a ton. The annual receipts from this source would be \$9,800,000. The cost of maintenance of the canal is estimated at \$2,000,000 a year. The surplus receipts, amounting to \$7,800,000, are to be applied to the payment of interest on capital at the rate of 3 per cent.

The report contains elaborate statistics showing the saving in time, money and distance effected by the use of the canal. The following table gives the distances in nautical miles between Havre and Liverpool, and the principal ports of the Mediterranean by way of Gibraltar and by way of the proposed canal:

Destination.	From Havre.			From Liverpool.		
	Distance via Gibraltar.	Distance by the canal.	Difference.	Distance by Gibraltar.	Distance by the canal.	Difference.
	(Nautical miles.)			(Nautical miles.)		
Barcelona	1,693	889	804	1,799	1,029	770
Marseilles	1,871	861	1,010	1,977	1,001	976
Genoa	2,036	1,045	991	2,142	1,185	957
Malta	2,162	1,461	701	2,268	1,601	667
Algiers	1,589	1,136	453	1,695	1,276	419

The voyage wherein the proposed canal would be of the least advantage is that from Hamburg to Port Said, although even in this instance there is a saving of 20 per cent. gained by passing through the canal. The waterway is to be so constructed that a speed of 10 knots can be maintained in the canal. It is calculated that the maximum delay at each of the twenty-six locks will be 27 minutes, or for the whole transit 11 hours 42 minutes. A vessel steaming at the rate of 8 knots would pass through

chamber of deputies to vote on the ship-canal bill before the close of the present session—that is to say before the end of April. The Waldeck-Rousseau ministry indorses the scheme, which is regarded in financial quarters with great favor, and not the least merit of which is that the three hundred odd million dollars required for the construction of the much needed ship-canal will all be expended in France.

The yacht Mayflower, which has been out of commission for six months, is to be refitted and repaired for President Roosevelt's use during the summer months. The Mayflower was built for the late Ogden Goelet of New York and was purchased by the government on April 19, 1898, two days before hostilities with Spain, for \$430,000. She is a superb craft, and as a president's yacht surpasses her predecessors of distinguished remembrance, the Tallapoosa, Despatch, Sylph and Dolphin. The Dolphin, which is to be superseded by the Mayflower, will be retained on surveying duty and special service. During the Spanish war the Mayflower served as gunboat and dispatch-boat in Cuba and Porto Rico under command of Com'dr Morris R. S. MacKenzie. She was sent to San Juan as a station ship when Charles H. Allen of Massachusetts was appointed civil governor of Porto Rico.

Rear Admiral George Wallace Melville, chief of the bureau of steam engineering, has asked the navy department for an appropriation of \$20,000 to be expended under the direction of his bureau for an investigation of the best means of burning fuel oil.

A bill has been introduced in the Virginia senate for a charter for the Norfolk & Hampton Roads Ship Building & Dry Dock Co. The plan of the projectors is to establish a plant on Elizabeth river, near Sewell's point.

Rear Admiral Mordecai T. Endicott has been reappointed for another term of four years as chief of the naval bureau of yards and docks.

LIQUID FUEL FOR SHIPS.

At the annual meeting of the Institution of Naval Architects in London last week Sir F. Flannery read a paper upon the subject of "Liquid Fuel for Ships" in which he discussed the comparative advantages and disadvantages of this form of fuel for both war and merchant vessels. His conclusions are very interesting and are as follows:

Comparative advantages and disadvantages for war vessels.—The problem that confronts every designer of a war ship is the combination of the greatest speed, armament and ammunition supply, protection, and range of action, in the smallest and least expensive hull, and any reduction of weight and stowage room of any of the necessary elements of any of these qualities is a saving which acts and re-acts favorably upon the problem in a manner familiar to us all. The practical figures of comparison between coal and oil fuel realized in recent practice are that two tons weight of oil are equivalent to three tons weight of coal, and 36 cu. ft. of oil are equivalent to 67 cu. ft. of coal as usually stored in a ship's bunkers; that is to say, if the change of fuel be effected in an existing war vessel, or applied to any design without changing any other of the data than those affecting the range of action, the range of action is increased by 50 per cent. upon the bunker weight allotted, and nearly 90 per cent. upon the bunker space allotted.

The coal protection for cruisers, whatever its real advantages—a matter upon which different opinions exist—would disappear with the use of liquid fuel, because it would be for the most part stowed below the water line, if not wholly in the double bottom. The double bottom and other spaces, quite useless except for water stowage, would be capable of storing liquid fuel, and the space now occupied by coal bunkers would be available for other uses. The ship's complement would be reduced by the almost complete abolition of the stoker element and the substitution of a limited number of men of the leading stoker class to attend to the fuel burners under the direction of the engineers, and the space of stokers' accommodation, the weight of their stores, together with the expense of their maintenance, would be saved. The number of lives at risk, and of men to be recruited and trained over a long series of years would be reduced, without reducing the maneuvering or offensive or defensive power of vessels of any class in the fleet.

Re-bunkering at sea—so anxious a problem with coal—would be made easy, there being no difficulty in pumping from a store-ship to a war ship in mid-ocean in ordinary weather; 300 tons an hour is quite a common rate of delivery in the discharge of a tank steamer's cargo under ordinary conditions of pumping. The many parts of the boiler fronts and stokehold plates, now so quickly corroded by the process of damping ashes before getting them overboard, would be preserved by the action of the oil fuel, and the same remark applies to the bunker plating, which now so quickly perishes by corrosion in way of the coal storage.

Liquid fuel, if burned in suitable furnaces with reasonable skill and experience on the part of the men in charge, is smokeless. It is easy to produce smoke with it, but this is evidence of its being forced in combustion, or of the detailed arrangements of the furnace being out of proper proportion to each other. In regard to smokelessness, it is, when used under conditions customary in the merchant service, not inferior to Welsh coal, and superior to any other coal ordinarily in use. The cost of fuel in the east is less than that of Welsh coal when the cost of transport and Suez canal dues are added to the original price of the coal as delivered in a Welsh port.

The evaporative duty required from the boilers of destroyers is greater than that required for boilers of any other type, and, whilst it is possible to burn enough liquid fuel to produce the required duty in boilers hitherto using coal at natural draft, or even coal at moderate forced draft, difficulty has been found in burning enough oil fuel in boilers of the destroyer type to produce the same duty as that realized under coal at great air pressure. The question of economy of fuel in destroyers when at full power is of comparatively little importance, but the production of the maximum power is essential; and further experiments now in process will probably solve the difficulty as it has been solved in locomotive practice on the Great Eastern railway by the skill and enterprise of Mr. Holden.

Messrs. Yarrow have obtained some highly encouraging results in two torpedo boats built by them for the Dutch government. Their process is to obtain the maximum speed with coal under all usual conditions of forced draft, and then to inject liquid fuel into the furnace above the coal, thus securing additional boiler duty, while leaving the whole of the grate surface available for coal combustion. The result was to increase the maximum speed of the vessel by over one knot per hour. Messrs. Thornycroft have recently made experiments, and have obtained the high evaporative duty of 18.95 lbs. of water per pound of oil fuel. The extra rapidity of raising steam with liquid fuel is undoubted, and this is a feature upon which much stress has been laid in recent naval debates. So far as experience has shown there is no deterioration of liquid fuel, however long it is stored before use.

Comparative advantages and disadvantages for mercantile ships.—The conditions which fuel most fulfill in the case of a mercantile vessel differ only in some respects from the conditions applying to a war vessel, the chief difference being that of cost. The question of direct cost is of little importance in a war vessel, provided the advantages above named are really secured in practice, but in a commercial vessel the direct cost of fuel, although here also necessarily merged in other questions, is of the first importance. The saving of stokers is considerable, although the complement should not be reduced below that necessary to assist the ship's engineers in overhauling, or in case of emergency. In some instances a stoker's and trimmer's crew of thirty-two is now represented by a fireman's crew of eight hands, whose duty, however, is mainly cleaning and helping the engineers with their greasing.

In the case of medium-sized vessels working with natural draft, the advantages of uniform steaming, irrespective of wind and ventilation, and of large reserve of steaming power, are the same for liquid fuel as for every other system of forced draft. The greatest commercial gain, however, is the increase of weight and space available for freight. Adopting the proportion of three tons coal as equal to two tons oil fuel we find a gain in weight of, say, 1,000 tons in the freight of a first-class Atlantic steamer, and a gain of nearly the whole of the bunker space, which, subject to drawbacks of non-stowage in the hot parts of the bunker space, would be available for measurement freight. Allowing for these, and assuming the storage of the whole of the fuel in the double bottom and

peaks, there would be a gain approaching 100,000 cu. ft. of measurement made available for freight in such a vessel. The gain from substituting the new fuel in vessels of less steam power proportionate to the size would be correspondingly reduced, but it may be fairly estimated for most ships that 25 per cent. of the space now occupied by coal bunker storage could be utilized for cargo by the transfer of the fuel in a liquid form to the double bottom and other parts not now of any direct use.

The cleanliness of oiling instead of coaling passenger ships, and the saving of detention at ports of call, are obvious. The provision of storage and pumping and ventilation arrangements and of the furnace gear are a disadvantage both as regards cost and weight, and in some ships trouble and expense has arisen from boiler leakage consequent upon the presence of water in the oil, and the lack of experience of the engineers, but these difficulties are now disappearing, and latest developments are in the direction of simplicity and less first cost. Oil fires do not require cleaning, thus avoiding a prolific source of lost speed in ordinary voyage routine.

PROPHECY AND FACT IN PIG IRON CONSUMPTION.

The violent swings of the pendulum in iron and steel production have been the despair of trade prophets. Yet much depends on the time range of the prediction. Attention has been called many times to the remarkable closeness of the Hon. Abram S. Hewitt's prophecy of 1856 to the actual pig iron production of the world in 1875. His figure was 14,000,000 tons; the statisticians twenty years later found that the production for 1875 was within a few thousand tons of this. In 1890 Mr. Hewitt predicted, on the basis of the observed arithmetical ratio of increase over a period of years, that the United States would produce in 1900 a total of 15,750,000 tons of pig iron and that in the same year the world's production would be 35,000,000 tons. The actual production for the United States fell below Mr. Hewitt's prediction, being 13,789,242, or nearly 2,000,000 tons less, while the world's production, estimated by James M. Swank to have been 40,400,000 gross tons, went more than 5,000,000 tons beyond the prediction.

It is worthy of note, however, that Mr. Hewitt's prediction for the United States was very close to the actual production for the year 1891, or one year later, and that Edward Atkinson, who also made a prophecy for 1900, was very close to the actual world's consumption for that year. In 1901 our production of pig iron was 15,878,354 gross tons, or 128,000 tons more than Mr. Hewitt's prediction for 1900, made eleven years before. Mr. Atkinson predicted consumption rather than production—though for the entire world these will be no great distance apart for a given year—and his figure of 40,000,000 tons for the world's consumption in 1900 was within 400,000 tons or 1 per cent. of Mr. Swank's estimate, which was largely based on official statistics. Mr. Atkinson, by methods similar to Mr. Hewitt's, arrived at a consumption of pig iron in the United States in 1900 of 15,500,000 tons. Though in 1895, in view of the panic with ensuing prostration beyond anything the country had ever seen, Mr. Atkinson published an article modifying his prediction for 1900, the outcome showed that there was a good basis for his computation. But for the mistakes of the boom of 1899 there would no doubt have been in 1900 such a year of iron and steel consumption as was the year following. Mr. Atkinson based his estimate of consumption in 1900 on a population of 80,000,000 and a per capita consumption of 400 pounds of iron. Our approximate actual consumption of pig iron in 1901 exceeded this considerably. Adding to the production of 15,878,354 tons the decrease in stocks in the year, 371,723 tons, and the imports of pig iron, 62,930 tons, and subtracting the exports, 81,178 tons, the apparent consumption was 16,231,829 gross tons. This divided by 76,000,000 gives a per capita consumption of 478.5 pounds. Between 1877 and 1889 our per capita consumption increased from 150 to 300 pounds a year. In the twelve years following 1899 the per capita increase was 60 per cent. instead of 100 per cent. In the same period the increase of population was from 64,000,000 to upwards of 76,000,000 or about 20 per cent. A like ratio of gain in population and in per capita consumption in the twelve years following 1901 would give a pig iron consumption in the United States in 1913 of 30,000,000 tons.—Iron Trade Review.

HAMBURG-AMERICAN PACKET CO.'S YEAR.

In common with other ocean lines the Hamburg-American Packet Co. shows reduced earning power for 1901. A dividend of 6 per cent. was declared as against 10 per cent. for 1900. The earnings were 20,348,314 marks, of which 993,793 marks went for interest, 14,429,453 marks were written off for depreciation and renewal and 4,800,000 marks were set aside for dividends. The directors say that low rates of freight in the North American trade had a good deal to do with the reduced profits of last year, the rates having fallen to a lower level than would have been considered possible a short time ago. Fortunately the passenger trade kept active all through the year, and as regards the future of the North Atlantic traffic in general, the directors say they are on the point of concluding arrangements with competing lines which cannot fail to turn out advantageous for this company.

Fourteen steamers were added to the fleet in the course of the year, ten others are now being built, and the total gross tonnage measurement has been raised to 661,355 tons, that of the ocean steamers alone being 630,091 tons. Three steamers were lost last year. As regards the use of oil for fuel, the directors state that numerous experiments were made with Borneo oil, but, although the technical results were excellent, financially the results were not so satisfactory. In order to provide fresh funds for the increasing extension of the company's operations, the shareholders are asked to sanction a further addition of 20,000,000 marks to the share capital. During the year 690 round voyages were performed; the total number of passengers carried was 211,617, and the goods conveyed totalled up to 4,252,000 cubic meters.

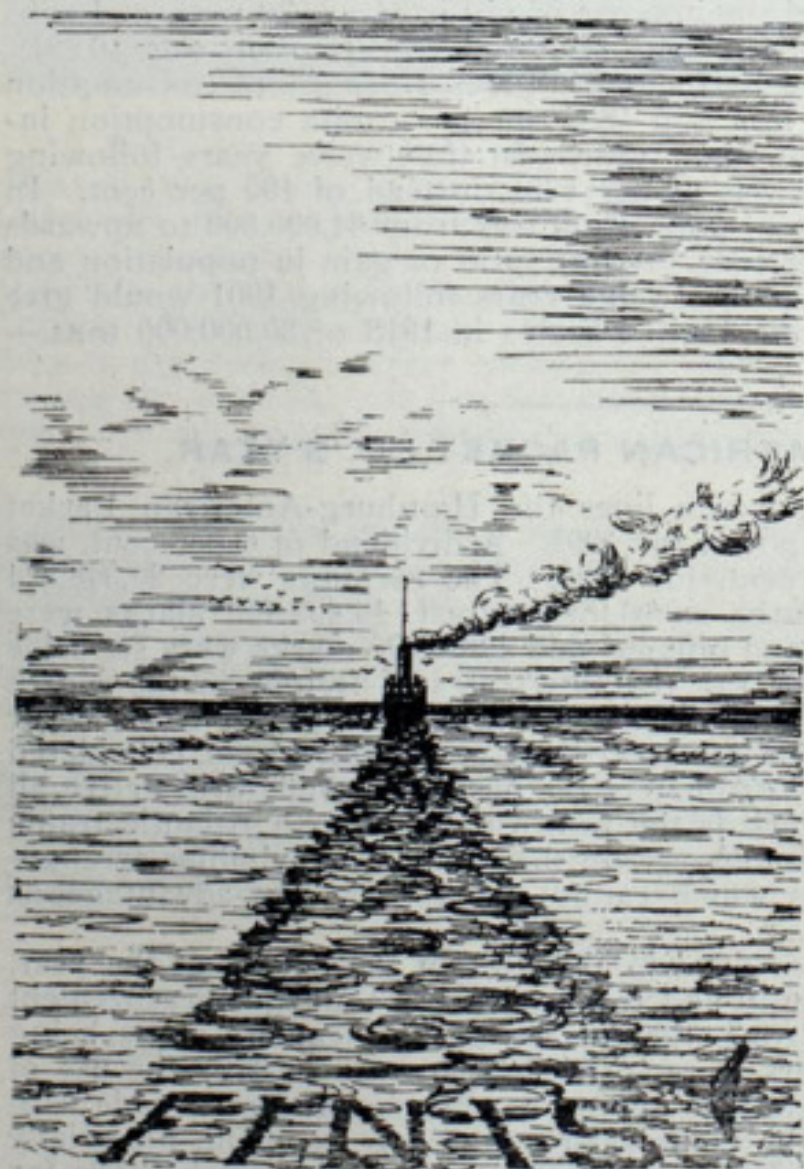
Inasmuch as the navy has done nothing toward raising the wreck of the Maine in Havana harbor, Gen. Wood has written a formal letter to the war department urging the propriety of removing the historic wreckage. He says the wreck is an obstruction to navigation in the harbor. To raise the wreck of the Maine will necessitate a large expenditure, the bids ranging from \$400,000 to \$700,000. Contractors in search of products for souvenirs have several times attempted arrangements for removing the wreck, but their plans collapsed.

A SHIP BUILDING ENTERTAINMENT.

The large hull drawing room at the headquarters of the American Ship Building Co., Cleveland, was given up last Saturday evening to a unique and instructive entertainment. Messrs. A. C. Dierix and A. P. Rankin, chiefs in the technical department, had arranged with their associates in the drawing rooms for a smoker. Nothing more than an informal entertainment was contemplated, but the list of invitations was gradually extended until it included superintendents and foremen of the ship yards and some of the principals of the company, and they were all there. Mr. Robert Wallace, who is one of the principal owners of the consolidated yards, but still keeps as close to the men as he did when he was a working engineer, consented to act as chairman, but spent most of his time shielding evidences of embarrassment on account of good things said of him from all quarters of the room. "The old gentleman," as he is familiarly called, in distinguishing him from Gen. Mngr. James C. Wallace, is certainly held in the highest esteem by everybody connected with the ship building works, and it was one of the pleasant features of this entertainment that he had reason to feel this honor before it was over with. He was ably assisted in the chair by Mr. Dierix, who proved quite equal to the occasion. Mr. James Wallace and Secretary R. C. Wetmore were also present.

A selection from an orchestra of some fifteen pieces, in which Mr. O. N. Steele of the engineering department of the ship building company is interested, was the first number in the specifications. The term program was not thought suitable to the occasion. Ship building parlance prevailed. It will be noted also by a couple of illustrations appearing herewith that the printing included designs of a ship building kind. The illustrations are from the front and back covers of the specifications, or program. The invitations were also very odd, gotten up in old style of type on smoky paper.

Mr. Steele's orchestra was not sparing of its music. It was heard repeatedly throughout the evening while refreshments were being served and also in several special numbers that were on the program. The first toast, "Our Country," was proposed by Mr. A. C. Heron, representative of Lloyd's Register in Cleveland. Mr. Heron is a good specimen of the type of active young Englishmen. An unassuming manner (with a great deal of ability in ship building matters back of it) has made many friends for him since he came to the lakes to look after the construction of two tramp freighters building at Cleveland for salt water service and which are to be of about 7,000 tons capacity on ocean draught. His remarks were brief but highly complimentary to America. Nature, in her allotment, was kind to the United States, he said, but he still cited many accomplishments of which a nation, and especially a young nation, has reason to be proud. We owe our greatness mainly, he thought, to inventive genius. He paid a warm tribute to the pioneers of the country. Capt. F. D. Herriman of the Great Lakes Register was to have replied to



this toast, but he was unexpectedly called out of the city Saturday afternoon. The chair made a brief reply to Mr. Heron and the company joined lustily in "My Country."

Capt. Samuel Fowler, who has sailed British vessels in all parts of the world for a great number of years, and who is to take command of the Minnetonka, one of the two tramp steamers building at the Globe yard, Cleveland, for transatlantic service, proposed the toast "American Ship Building Co." In doing so he said:

"It is not often that an old sailor is called upon to make a speech. Our speeches are generally delivered from the quarter deck when the ship is under full sail and we see a squall tearing its way towards us from leeward. Speeches on such occasions are usually in very forcible language. I have been asked to toast the American Ship Building Co. and it gives me great pleasure to do so. I admit that I came here somewhat preju-

diced against lake vessels. This was partly due to disparaging remarks heard a few weeks previous to my coming. I had occasion to dry dock a ship at one of the large yards on the coast. I told one of the officials that I expected to go to Cleveland to take command of a steamer building there for ocean service. 'I hope you will find her a better built ship,' he said, 'than the class of lake boats we have frequently to repair in this yard. They give us some of our heaviest repair jobs.' It is a matter of a great deal of satisfaction to me now to feel that I shall have the pleasure of showing the Minnetonka in that same port; the pleasure of inviting them to inspect her from stem to stern, from keel to truck, and if she does not open their eyes to the conviction that they never have built and never will build a stronger ship than the Minnetonka, then I don't know what I am talking about. I came to Cleveland without the slightest authority to insist upon any one thing being done to the Minnetonka, other than what the builders chose to do, but I must say that had I been the owner I could not have been treated with more courtesy from the officials of the company, from the highest to the lowest, and any suggestions I have made in regard to details for the benefit of the ship and owner have been responded to with great cheerfulness. I was soon satisfied after coming here that the Minnetonka is far and away the strongest-built and best-finished cargo boat I have ever seen, and I challenge the most expert naval architect of any country to find fault with her structural make-up, her finish or her outfit, for I believe she is one of the two best-built and best-fitted cargo boats in the world. Let me tender my hearty thanks to the officials of the company, including the Globe yard foremen, for the courteous treatment I have received at their hands and let me propose three cheers for the continued success of the American Ship Building Co."

The cheers were followed by a song from Mr. Fred J. Trist and the interim was long enough to give Gen. Mngr. J. C. Wallace, who was to reply, opportunity to cover up embarrassment due to the lavish praise of the salt-water ships. He is proud of them and he admitted it in replying modestly as he could to Capt. Fowler's very complimentary remarks. "You are all the American Ship Building Co.," he said to the assembled superintendents, foremen and others who were listening to him intently, but who did not expect at this time any more than on other occasions to hear him waste words. "Your earnest efforts and endeavors," said Mr. Wallace, "are a prime source of success in the affairs of this company and I am pleased to have the opportunity of saying that much to you here tonight."

There was song and music between the toasts and the program was really one of great variety. Even the ladies were toasted and remembered by Alex. Hinds and Joseph R. Oldham, respectively. Mr. Oldham drifting into praise for woman in literature, in the sciences and in invention. Of course the occasion would not permit of Grace Darling being forgotten while the praises of the heroines were being sounded.

Mr. Robert Wallace, proposing the toast "Ship Owners and their Representatives," referred briefly but in a very earnest way to many of the old-time owners, naming some of them who were his personal friends. He paid a tribute to Geo. Presley, one of the oldest of the vessel owners, whose death had been announced the same day, and who, Mr. Wallace said, had led an honorable and useful life. Capt. Mallory and Capt. Weeks made brief replies, referring especially to conditions surrounding the lake business in early days.

Robert Logan, ship building expert, toasted "The Men Behind the Gun." He knows them—the men behind the machine guns—from Superior to Buffalo, and has repeatedly found occasion to recognize their ability. This toast gave Mr. Frank Smith, one of the chief engineers of the Pittsburg Steamship Co., opportunity to direct attention to the part the engineer has taken in the advancement of ship building; to the engineer's devotion to duty, and to the credit that should be given to him in the late war with Spain. Mr. O. N. Steele, superintendent of the machinery department of the company in Cleveland, made the principal reply to this toast. He, too, spoke of the part the "man behind the gun," the engineer, had taken in the trip of "the bull dog of the navy," the battleship Oregon, from the Pacific to the theater of war at Cuba. Continuing, he said:

"It was 'the men behind the gun' who made a large portion of the glory that attaches to the name of Paul Jones. It was 'the men behind the gun' who furnished a large portion of Perry's famous message, and it is 'the men behind the gun' in many a shop and factory today, whose praises are unsung and whose faithfulness and efficiency meet the eyes of immediate superiors only, who are contributing much to the wealth of our country but far more of healthful influence on the coming generation. The facts brought out in these events of the importance of work entrusted to men in subordinate positions and their faithfulness has led to the application of this now historic phrase to a great many walks in life. It has become a favorite topic for assignment to speakers holding subordinate official station and I fancy this is the reason for its assignment to me, for you have honored me by placing me behind a part of this great ship yard gun of ours and you have given me a gun squad of no mean proportions. But you place me in a somewhat embarrassing position. Being one of 'the men behind the gun' I have to direct its fire. I must see to the loading of it. I must keep watch and word over its ammunition and keep it in perfect condition to destroy at your command our twin enemies, 'competition and no dividends,' and when I feel, as I do, that I have accomplished some little in that line and attempt to tell it to you, I lay myself liable to the charge (as the small boy puts it) of 'tossing bouquets at myself.' But as some other folks have apparently purchased a few flowers, I may be permitted perhaps a small little nosegay. We have a glorious ship here in our American Ship Building Co. We have tried and trustworthy officers on the bridge. We have a splendid captain and we have directors whose skillful assistance has thus far kept our ship from the shoals of inactivity, from the rocks of financial trouble and have guided us into the deep water of prosperity. We have been especially favored throughout our corporate existence with skillful and efficient officers. Our officers have been very successful in getting us contracts, in keeping our forces employed, but all the contracts in the world would not turn out a finished ship without the men in the yards, without the 'men behind the gun.' A contract once taken involves a multiplicity of detail, a thousand and one things are to be arranged and cared for. Designs must be at hand. The object with which the ship is being constructed is always of primary importance. Plans and drawings must be made for every one of its different departments and these plans again subdivided into the different shops of this great corporation. Hubbard in his 'Message to Garcia'

in speaking of subordinates says: 'Slipshod assistance, foolish inattention, dowdy indifference and half-hearted work seem the rule, etc.' While this may be true in a great many instances and while it shows one of the many perplexities your superintendent has to contend with, I feel that the reverse is true in our own institution. We have been fortunate in the selection of our subordinate officials and fairly so with our workmen, and as a result we have a harmonious force from our president down to the lowest sub-foreman in the employ. Consequently when our plans are received from the technical department and distributed through all the working departments, when the moulding room has completed its work, when the iron has been received for the ship, when this mass of detail has been attended to, then 'the men behind the gun' have all their ammunition. They load the gun through expert workmanship in the various departments, and when launching day comes, fire the finished product into the water and it becomes the stately ship. Gentlemen, 'the men behind the gun' in all the walks of life are entitled to your consideration. We should give them a little more recognition, because the higher their ideals, the better will be the work they do."

Mr. Jeffrey of the Lorain ship yard, Mr. William Sutton of the Cleveland yard, and Mr. George Waterbury, assistant to Mr. Steele in machinery work, were also called upon and responded briefly. Among those who contributed to the musical part of the entertainment were Riley Dickey, H. N. Herriman, John W. Alexander, Fred J. Trist, Elmer Waite, Adam Steele and a quartette made up of Messrs. Trist, Frey, Wheeler and Foster.

A NIAGARA RIVER OBSTRUCTION SCHEME.

Buffalo, April 2.—The Mather power bridge scheme is up again, this time in congress in the form of an enabling act, as per bill 12,762, introduced in the house by Representative Ryan of Buffalo. If the many meritorious projects for bettering conditions and people in and about this city and port were as persistent as this one, the whole community would be racing towards millennial days. The unthinking citizen has usually endorsed the Mather scheme, saying that it is harmless, and as it does not ask for money why not let it have a trial? If there is power to be developed in that way it will come in all right in these days of scheming for cheap energy.

So the scheme went through the legislature and is now before the local engineering service for a report. While Maj. Symons does not make a practice of giving away his reports to the public, it is well known that he is opposed to it and will so report, as have his predecessors in the government service here. It is probable that such official opposition as can thus be obtained will be enough to kill the bill, but if it is not there should be something done to show up the scheme by vessel owners, for it would ruin the Niagara river as a navigable water, as any vessel man can easily see. The present international bridge is such a menace to navigation that a powerful tug has to be maintained by the bridge company on the watch constantly, so that it can give instant aid to vessels that may happen to be unable to stem the rapids.

But this bridge is at the foot of these rapids, while the Mather bridge must be placed over the very swiftest of the rapids, which at times, especially when the wind is down the river, run 11 miles an hour. No opportunity is given by the "clear span of not less than 200 ft." for a vessel to make the best of the channel and avail itself of the slack water towards shore, now very valuable to vessels that can venture into the more shallow water. Besides, the presence of a second obstruction only a short distance from the first greatly increases the danger. As the demand for more draught and larger vessels increases so fast, it is found every year that the Niagara channel at its best is far from what it should be, so that there is now a demand for the enlargement of the ship-canal that was built around the rapids long ago, but which is now too shallow for much use. What will be done in the matter will probably depend on the development of the project of damming the head of the river to raise the lake level. As this improvement is not likely to be undertaken right away, if ever, the chances are that Niagara river will be left about as it is for an indefinite time. But now reappears a scheme that would obstruct the channel much more than any low submerged dam is likely to and all for private purposes.

Engineers have always maintained that no power of account can be developed by a current wheel. In fact that sort of wheel was out of date long before the turbine was in use. As this is all that the Mather idea claims to be, a current wheel invention, it has always been held that the power question was a mere blind and that a bridge and nothing else was all that would come of the undertaking. The present Ryan bill takes care to provide for a full-fledged bridge and the opponents of the entire project see some powerful railroad behind it, ready to occupy as soon as the bridge is finished.

The bridge question, as such, has been fought out and settled, so that there would be no opposition to the building of one in the slack water below the city, but the river is much wider there than it is opposite the city, which accounts for the International bridge being placed where it is. The bill empowers the "corporation" to command right of way to all needed approaches and in other ways betrays the fact that the power idea is by no means what is asked for. If Mr. Mather wants to demonstrate the amount of power he can develop in the current he can anchor two tugs or scows in the rapids some day and drop his wheels overboard. He can learn in that way without an enabling act what he can do.

JOHN CHAMBERLIN.

Capt. W. W. Brown of Cleveland and Mr. H. S. Wilkinson of Syracuse, N. Y., have purchased from the Jenks Ship Building Co. of Port Huron a freight steamer already on the stocks and which is to be completed about Aug. 1. The vessel is 440 ft. over all, 420 ft. keel, 50 ft. beam and 28 ft. depth. Capt. Brown already has in hand the management of five steel steamers, which are under construction by the American Ship Building Co., and which are to come out early in the present season. He also manages the wooden steamer Presley and consort Redington.

The steamship Alaskan, built by the Union Iron Works of San Francisco for the American-Hawaiian Steamship Co., will be ready for her trial trip in a few days. She was launched last May.

PENSIONS FOR LIFE SAVERS.

As announced in the Review last week, bills are now pending in congress to pension officers and enlisted men of the life-saving service and their widows and children. In this measure lake interests are vitally interested. The Lake Carriers' Association, Ship Masters' Association and the organizations of masters and pilots and marine engineers have all been asked to have copies of the following petition sent to congressmen from all the lake districts and senators from the lake states:

"Whereas, a bill has been introduced in the house of representatives, being H. R. 163, and referred to the committee on interstate and foreign commerce, wherein provision is made for 'granting pensions to certain officers and enlisted men of the life-saving service, and to their widows and minor children,' and

"Whereas, the men of the merchant marine appreciate the character, heroism and efficiency of the men of the life-saving service, and

"Whereas, we are familiar with the work of the life-saving service, and with the hardships suffered, and perils encountered by the life savers, in the performance of their duties, it seems to us to be just, fit and proper that the men of the life-saving service should be compensated in case of disability received in such service, and that their widows and minor children should be provided for by the government, in case of the loss of life of such members of the service in the performance of their hazardous duties. It seems to us especially fit and proper that whereas the members of the service must necessarily be young men of perfect physical condition, and whereas the pay of the service is so small that they could not possibly acquire a competence, and in case of death or disability must necessarily leave their families and dependents without means of support, therefore, be it

"Resolved, that we favor the passage of the bill hereinbefore mentioned, or such amended bill as may seem to congress fit and proper, and sufficient for the purpose; and we, therefore, hereby petition congress to consider and pass the said bill, hereby urging the committee to which it has been referred to consider and return the same as soon as possible; and be it further

"Resolved, that as each and every member of this petitioning body is personally interested in the work of the life-saving service; that a copy of these resolutions be sent to the honorable chairman of the committee on interstate and foreign commerce, with the request that he call the attention of the committee to the same, and that copies of these resolutions be also forwarded to the representatives in congress of our respective districts, with the request that they take interest in the measure, and use their efforts to procure its passage."

INCREASING PERSONNEL AND ENLISTED FORCE.

During the past few days the needs of the navy have been the subject of conferences between the president and members of the house committee on naval affairs. A plan was outlined providing for a liberal increase in the personnel and enlisted force. This is the first time the president and members of the committee have given attention together to the navy and the results of the meeting indicate that relief is at last to be afforded through graduation of naval cadets, a large increase in the enlisted force and additional marines. Nothing was said on the question of ships, but the sentiment of the committee is known to be favorable to three first-class battleships and three armored cruisers of the heaviest displacement constructed upon designs presented to congress in December. The committee inclines to the argument advanced by Secretary Long that the continued building of battleships and armored cruisers is demanded and that no other types are necessary until a strong force of these classes is ready for service. President Roosevelt expressed his deep interest in the up-building of the navy and pointed to the recommendations made in his annual message for more ships, officers and marines, and informed members that during his administration he would urge congress to provide each year for a number of powerful warships. The two naval committees expect to adopt some plan by which the yearly graduation from Annapolis may be considerably increased, although there is no purpose to have this increase continue longer than is required to secure officers for ships built and in course of construction. The plan which the president approved provides for an increase of about 500 appointments as naval cadets in the next few years, distributed among senators and at-large appointments by the president. Both the president and the two committees recognize the danger of an over-production of officers at Annapolis should the plan be made permanent and the lower grades so increased as to cause stagnation in promotion. The grades of ensign and junior lieutenant are now 150 officers short and at the present rate of graduation, with the annual vacancies following retirements and casualties, never can be filled. With these places filled there would still be required 200 or 300 additional officers, and it is proposed to secure them within the next few years from Annapolis cadets. The effect of any legislation, however, could not be felt in less than from four to six years, as this time is required to educate and graduate cadets from the school. Reducing the course from six to four years and commissioning cadets as ensigns immediately upon graduation probably will be a part of the program adopted this session. Twelve hundred additional marines and 2,000 more sailors are believed by the president to be required for the service, and members of the committee at the conference this morning stated that these numbers would be approved.

Notifications are being sent to members of congress informing them of vacancies they may be entitled to at Annapolis for the approaching examination in May. There are now 125, including an at-large vacancy, which is to be filled by the appointment of Admiral Sampson's young son. This is the only place at the president's disposal, although from the number of applications he continues to receive the impression seems to prevail that he has a score or more.

The barge John C. Fitzpatrick, which went ashore on Shovelful shoal on March 17, was floated at high water Sunday and was taken in tow to Boston by the tug Sweepstakes. The fund for the widows and children of the members of the Monomoy life-saving crew, which lost their lives in the attempt to rescue William H. Mack of Cleveland and his companions on board the stranded barge Wadena, has reached a total of \$40,000. In addition independent funds are being raised for Capt. Mayo and Surfman Ellis.

OFFICERS OF LAKE VESSELS FOR 1902.

ALGOMA CENTRAL STEAMSHIP LINE, Sault Ste. Marie, Ont.

Str. Monkshaven ..	Capt. W. O. Zealand	Engr. P. W. Lyon.
" Theano ..	G. W. Pearson ..	J. L. Smith.
" Leafield ..	W. C. Jordan ..	Jas. Gregg.
" Paliki ..	B. Garvie ..	A. F. Foote.
" H. A. Barr ..	J. A. Slammon ..	.....
" J. J. Barlum ..	E. J. Cadotte ..	.....
" Ossifrage ..	A. C. Cameron ..	J. G. Fisher.
" Minnie M.	A. A. Batten ..	Jos. Grimes.
" King Edward ..	F. X. LaFrance ..	A. Beatty.
Tug Philadelphia ..	A. L. Campbell ..	Thos. Horgon.

DRAKE & MAYTHAM, Buffalo.

Str. Chili ..	Capt. Jas. R. Gibson	Engr. A. P. Stewart.
" Maytham ..	L. B. Cummings ..	Alex. McLean.
" America ..	Henry Leiske ..	H. W. Beale.
" Brazil ..	Robt. R. Gibson ..	Wm. Pilkey.
" Vega ..	Jos. Hulligan ..	T. Harringer.
" Vulcan ..	Geo. Graser ..	Geo. Froggett.
" Alcoma ..	W. L. Sutherland ..	.....
Schr. Alta ..	J. McNamara ..	.....
" H. W. Sage ..	Geo. Lauchlan ..	.....

DESERONTO NAV. CO., Deseronto, Ont.

Str. Resolute ..	Capt. Jno. Gowan	Engr. Jno. Harrison.
" Reliance ..	Jas. Dougherty ..	Jno. Toppings.
" Ella Ross ..	D. B. Christie ..	Jno. McFaul.
" Deseronto ..	Wm. Skillin ..	Geo. Stevens.
" Rescue ..	Jno. Rowe ..	Owen Flood.
" Ranger ..	H. Burnip ..	W. Stanhope.
" Nile ..	W. J. Daly ..	T. L. Morton.
" Armenia ..	.....	.....

PERE MARQUETTE R. R. CO.,

W. L. Mercereau, Supt. of Steamships, Ludington, Mich.

Str. P. Marquette No. 2	Capt. W. J. Barnett	Engr. Geo. Depuy.
" P. Marquette No. 3	F. A. Dority ..	Geo. Williams.
" P. Marquette No. 4	Jos. Russell ..	Robt. McLaren.
" P. Marquette No. 5	Jno. J. Doyle ..	Henry Nyland.
" Pere Marquette ..	J. C. Ackerman ..	R. Thielman.
" P. Marquette No. 16	G. L. Thompson ..	S. Sylvester.
" P. Marquette No. 17	Peter Kilty ..	A. W. Ackerman.

LAKE SAND & GRAVEL CO., R. E. Doherty, Secy., Toledo, O.

Str. Walter D.	Capt. J. B. Warner	Engr. F. Shepler.
" Laura D.	Frank Lamb ..	E. Parker.
" Ella G.	J. U. Cook ..	Geo. Gillespie.
" Commerce ..	E. Doherty ..	Robt. Burke.
" Syracuse ..	Jno. Mulinix ..	J. Mulinix.
" D. Deasault ..	Jno. Moesing ..	V. Felder.

LEHIGH VALLEY TRANS. CO., T. T. Morford, Mgr., Buffalo.

Str. Mauch Chunk ..	Capt. P. McFarlane	Engr. D. H. Fox.
" Wilkes-Barre ..	H. Driscoll ..	C. R. Plodeck.
" Tuscarora ..	W. Williams ..	A. A. Brown.
" E. P. Wilbur ..	C. E. Fuller ..	H. Mellon.
" Saranac ..	C. A. Potter ..	H. King.
" Seneca ..	J. A. Whiteside ..	R. Hill.

UNION STEAMBOAT LINE, T. T. Morford, Mgr., Buffalo.

Str. Starrucca ..	Capt. Walter Robinson	Engr. Jno. Leahy.
" Ramapo ..	J. H. McDonald ..	H. C. Jordan.
" Chemung ..	F. B. Huyck ..	C. Coughain.
" Owego ..	Jno. Dugan ..	E. Hull.
" Tioga ..	J. J. Wulke ..	H. Johnson.
" H. J. Jewett ..	Geo. T. Morris ..	T. C. Tennant.

RUNNELS & SINCLAIR, H. E. Runnels, Mgr., Port Huron, Mich.

Str. Maggie Duncan ..	Capt. Jas. Cassin	Engr. J. C. Watson.
" O. O. Carpenter ..	J. E. Rathbun ..	H. Folkert.
Schr. Favorite ..	L. Sinclair ..	.....
" Constitution ..	E. R. Tousley ..	.....
" E. E. Tyson ..	C. W. Annis ..	.....

KOTCHER, C. W., 643 Gratiot St., Detroit.

Str. Saginaw ..	Capt. Wm. Hoffman	Engr. Milo O. Roach.
" B. W. Blanchard ..	Wm. Crockett ..	Jno. Bloom.
" Jno. H. Pauly ..	A. H. Shafer ..	.....
Schr. Mike Corry ..	H. E. N. Tracy ..	.....
" Anna P. Grover ..	Alex. McLean ..	.....

EGAN, W. M., Managing Owner, Chicago.

Str. W. M. Egan ..	Capt. F. Howe	Engr. C. H. Deam.
" P. D. Armour ..	F. D. Chamberlin	C. Keating.
" Jno. Plankington ..	L. H. Powell ..	Jas. Rossan.
" R. P. Fitzgerald ..	L. E. Boyce ..	F. Coleman.

NESTER, GEO., Detroit.

Str. Schoolcraft ..	Capt. Jos. Bourassa	Engr. Jno. Barr.
Schr. Geo. Nester ..	E. J. Peabody ..	.....
" Mary N. Bourke ..	C. Hanley ..	.....
" Keweenaw ..	Jno. Hochrath ..	.....

OWEN, GEO., Ashtabula, O.

Str. J. E. Smith ..	Capt. F. E. Nettleton	Engr. Henry Hess.
" Jennie Hayes ..	D. W. Nettleton ..	Fred Blythe.
" L. W. Knapp ..	Alva Snell ..	Peter Sasmussen.
" N. H. Dow ..	Chas. Owen ..	Wm. Jones.

DUNHAM, R. J., Chicago.

Str. City of London ..	Capt. Wm. Anderson	Engr. Wm. P. Eales.
" Ravenscraig ..	S. Thurston ..	.....
" Black Rock ..	Gus E. Atkinson ..	Jno. W. Clark.

RUNNELS, H. E., Port Huron, Mich.

(Manager for estate of Thos. Currie.)

Str. City of New York ..	Capt. Guy G. Geel	Engr. G. Kelley.
Schr. Wm. Grandy ..	D. Gleason ..	.....
" Geo. H. Wand ..	.....	.....

COLLINS BAY RAFTING & FORWARDING CO., Kingston, Ont.

Str. Orion ..	Capt. Geo. Mackey	Engr. Jos. M. Carr.
" Petrel ..	J. P. Angrove ..	Jos. Branch.
Schr. Muskoka ..	P. Gallagher ..	.....

OSCODA & CLEVELAND TRANS. CO., St. Clair, Mich.

Str. City of Holland ..	Capt. F. J. Meno	Engr. Jos. Meno.
" Pilgrim ..	E. Hayward ..	Henry Meno.
" Douglas ..	J. E. Meno ..	Jno. Bugner.

PORT CLINTON TRANS. CO., F. H. Rae, Mgr., Vermillion, O.

Str. Leland ..	Capt. F. H. Rae	Engr. W. H. Stackhouse.
Schr. Racine ..	Wm. Duff ..	.....
" J. G. Blaine ..	C. H. Ripson ..	.....

McFALL, E.,

Manager, Sandusky & Islands and Erie & Buffalo Steamship Companies, Sandusky, O.

Str. Pennsylvania ..	Capt. H. Tyrie	Engr. E. Perry.
" Arrow ..	Geo. A. Brown ..	J. Weiss.
" Lake Side ..	F. Nagle ..	E. Passno.

RITCHIE, JOHN W., Bay City, Mich.

Str. Langell Boys ..	Capt. E. M. Goodwin	Engr. G. W. Merrill.
Schr. J. B. Comstock ..	Chas. Lyons ..	.....
" ..	N. Johnson ..	.....

YOUNG TRANS. CO., W. D. Young, Mgr., Bay City, Mich.

Str. Arizona ..	Capt. J. G. Sauer	Engr. John Lee.
Schr. Scotia ..	Alex. McCormick ..	.....
" Plymouth ..	Geo. J. Sauer ..	.....

PORT HURON & DULUTH S. S. CO.,

C. O. Duncan, Traffic Mgr., Port Huron, Mich.

Str. Wyoming ..	Capt. J. C. McLean	Engr. Geo. H. Bonnett.
" F. R. Buel ..	A. McCowan ..	W. Thorne.

WARREN, WM., Tonawanda, N. Y.

Str. P. H. Birkhead ..	Capt. W. J. Hayes	Engr. H. DePew.
Schr. C. H. Burton ..	T. McDermott ..	.....

HILL, L. P., Managing Owner, Waukegan, Wis.

Str. C. Hill ..	Capt. W. E. Hill	Engr. W. W. Hill.
" City of Marquette ..	L. L. Hill ..	T. Tosland.

BELKNAP & PHILLIPS, St. Clair, Mich.

Str. C. Hickox ..	Capt. T. Emmy	Engr. J. Smith.
" Maud ..	F. Howard ..	Albert Hamlin.

HAWGOOD, HENRY A., Cleveland.

Str. S. S. Curry ..	Capt. Geo. Robarge	Engr. Geo. Wilson.
" Etruria ..	T. C. Ellis ..	R. R. Buchanan.

KELDERHOUSE, JOHN, Buffalo.

Str. Thos. Maytham ..	Capt. L. B. Cummings	Engr. Alex. McLaren.
Schr. H. W. Sage ..	John Laughlin ..	.....

SHEBOYGAN-PORT HURON SALT TRANS. CO., Sheboygan, Wis.

Str. John Oades ..	Capt. T. Leamay	Engr. Jno. Geminhard.
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FORD, EDWARD, Rossford, O.

City of Rossford ..	Capt. D. F. Doherty	Engr. H. B. Ransom.
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RICHARDSON, THOS., Milwaukee.

Str. Bloomer Girl ..	Capt. Thos. Richardson	Engr. B. C. Court.
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CONNELLY, JOHN A., 5851 Wabash Ave., Chicago.

Str. R. A. Packer ..	Capt. Jno. A. Connelly	Engr. E. B. Picke.
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HANSON, O., Manitowoc, Wis.

Schr. W. Wing ..	Capt. O. Hansen ..	
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HASKIN, E. W., Saginaw, Mich.

Str. Chas. H. Davis ..	Capt. E. W. Haskin	Engr. Wm. Carrick.
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MORLEY, C. T., Marine City, Mich.

Str. John J. Hill ..	Capt. C. T. Morley	Engr. S. O. Durant.
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BUCKLEY, EDWARD, Manistee, Mich.

Str. Edward Buckley ..	Capt. Chas. Gnewuch	Engr. E. Smith.
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WHITE, WM. H., Boyne City, Mich.

Str. John Spry ..	Capt. L. W. Young	Engr. W. Bacon.
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SMITH, & CO., WM., Waukegan, Ill.

Str. Elsie-Nell ..	Capt. Richard Smith	Engr. Henry Ernst.
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MORLEY, L. M., Rochester, N. Y.

Str. Hugoma ..	Capt. W. McLean	Engr. T. McDonough.
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INDIANA TRANSPORTATION CO., Michigan City, Ind.

Str. Mary ..	Capt. A. N. Napier	Engr. Wm. Johnson.
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WESTBROOK, E. H., Marine City, Mich.

Schr. Homer ..	Capt. W. Kemiss ..	
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CARPENTER, N. D., Detroit.

Str. A. L. Hopkins ..	Capt. D. R. Parsons	Engr. L. Brown.
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INTERNAL COMMERCE.

A REVIEW OF TRADE BY THE TREASURY DEPARTMENT SHOWS THAT BUSINESS IS GROWING STEADILY—HOW THE INFORMATION WAS COLLECTED.

The February summary of internal commerce, issued by the treasury bureau of statistics, reports the progress of trade movements in the different parts of the United States for the first two months of the calendar year. These figures are gathered through the co-operation of the commercial organizations, trade periodicals and transportation companies, and present from month to month records in comparison with the corresponding period for the preceding year. The receipts of wheat, for example, at the four leading spring wheat markets for the seven months of the crop year ending with March 1, 1902, were 144,889,226 bu., compared with 107,759,027 bu. for the corresponding period of the preceding year. This increase has given a decidedly stronger impulse to traffic and values throughout the entire northwest where a return to good harvests has stimulated immigration to an extraordinary extent. At the four winter wheat markets the condition is reversed. Receipts for the first eight months of the crop year ending with March 1, 1902, were 40,431,520 bu., compared with 57,899,542 bu. in 1901. The output of flour at Minneapolis for the first nine weeks of this year shows a total of 2,504,405 bbls., compared with 2,250,260 bbls. for the corresponding period of 1901, and 2,853,714 bbls. in 1900. The average shipments per week thus far this year have amounted to 283,301 bbls., compared with 244,497 bbls. in 1901, and 300,844 bbls. in 1900. The northwestern stocks of wheat in store at Minneapolis and Duluth show that Minneapolis reached its maximum in the week ending with Jan. 25, while the stocks at Duluth still continue to accumulate, awaiting the opening of lake navigation.

The traffic movement of livestock at five western markets—Chicago, Kansas City, Omaha and St. Joseph—falls behind that of the preceding two years. For February, 1902, those markets received 41,387 cars; for 1901, 41,933 cars, and for 1900, 41,599 cars. The numerical receipts, however, for the two months ending with February continue to exceed those of the preceding two years. The arrivals of cattle, hogs, sheep, horses and mules aggregated 5,617,276 head, compared with 5,409,148 head last year and 5,114,356 head the preceding year. The average weight of hogs received at Chicago for February of this year was 16 lbs. lighter than for February, 1901. For the two months ending with February this year's livestock receipts at Chicago amounted to 2,900 carloads more than for the corresponding period of last year. At Kansas City receipts and shipments show a fall in numbers. Carload arrivals have decreased from 22,000 cars in the first two months of 1901 to 16,634 cars for the corresponding period of 1902; the volume of traffic is thus being unfavorably affected by the reduction in supply. Likewise the feeder movement decreased from 115,897 head in the first two months of 1901 to 85,374 head during January and February of 1902. At Omaha receipts declined, but shipments and local consumption have been considerably enlarged over last year. At this market the average weight of hogs has fallen off 20 lbs. compared with February, 1901. Receipts and shipments at St. Louis bear out the same general conclusion, both for February and for the two months ending with February. At St. Joseph, however, an advancing tendency is still in control of receipts for February and of receipts and shipments for the two months ending with February. Local consumption is particularly active, though the feeder movement is losing ground. Stocks of cut meats at Chicago, Kansas City, Omaha and St. Joseph are noticeably larger than they were at the end of February in 1901. For the nine weeks ending with March 1 the shipments of cured meats from Chicago fell off from 124,000,000 lbs. to 104,000,000 lbs., though there was a gain of over 13,000,000 lbs. in dressed beef shipments. Throughout the list there is a tendency to lighter trade activities in produce, though there are many noteworthy exceptions in the commercial activities of the great interior markets. Lumber and wool at Cincinnati show liberal gains over the first two months of 1901. At St. Louis wool receipts are two and one-half times larger than in the first two months of last year. The receipts of broom corn at Indianapolis for this year to the end of February amounted to 1,532,000 lbs., of which only 106,800 lbs. were shipped. The hay trade shows remarkable increases of receipts at New York, Cincinnati, St. Louis and Chicago out of eight leading markets reporting in the east and west.

On the great lakes there are signs of an early opening of traffic. The bureau's reports of winter traffic show that 180,106 tons were handled, mostly in trans-lake business, during February of this year, as compared with 168,332 tons during February, 1901. For the first two months of this year the freight carried was 363,525 tons, compared with 368,782 tons in 1901. There were 1,235 arrivals of vessels representing a registered tonnage of 1,353,699 tons at twenty-four different ports participating in winter traffic. The trunk line movement of flour, grain, and provisions from Chicago and Chicago points eastward for the first nine weeks of the current year averaged 173,068 bbls. of flour, compared with 191,975 bbls. for the corresponding period of 1901; 1,956,488 bu. of grain, compared with 2,376,444 bu. in 1901, and 26,117 tons of provisions, compared with 22,395 tons in 1901. At New York the grain and flour receipts for February were 4,998,891 bu. (including flour and meal reduced to bushels) compared with 8,490,092 bu. in February, 1901. At Boston the receipts for two months of this year (including flour and meal reduced to bushels) were 4,917,904 bu. compared with 7,326,394 bu. in 1901. At Philadelphia the reduction is from 6,773,392 bu. of wheat, corn and oats to 2,444,351 bu. this year. Baltimore's receipts likewise declined from 5,462,257 to 1,054,838 bu., not including flour. The receipts of domestic tobacco at New York for the first nine weeks ending with February, 1902, were 13,019 cases, compared with 25,651 cases a year ago. At Boston traffic has felt the effects of a reduced crop movement. The favorable position of domestic wool in the Boston market at the beginning of the year is evidenced in the fact that out of a total of foreign and domestic receipts amounting to 103,345 bales, 89,834 bales came from domestic sources, and 13,491 from foreign sources. Shipments of boots and shoes from Boston to over 130 towns throughout the country outside of New England, for the first nine weeks of the year, were 795,771 cases, compared with 770,748 cases for the corresponding period of 1901.

In the coastwise commerce on the Atlantic and Gulf ports one prominent feature is the carriage of coal by barge lines and schooners to Boston from middle Atlantic ports of distribution. During February domestic coastwise receipts were 224,634 tons out of total receipts amounting to 288,182 tons. Receipts and shipments of merchandise between New York and New England ports are given for nine leading points on the eastern coast. From New York four leading coal companies report January shipments of 347,754 tons to seventy-six specified destinations, mostly on the New England coast. Reports of part of the movement from Philadelphia for January give a total of 177,683 tons. During January a total of 552 vessels in the coasting trade arrived at Baltimore, representing a registered tonnage of 437,318 tons. During February 410 coasting vessels arrived at New York.

In southern territory the cotton movement for six months ending with February, 1902, reached a total of 8,661,604 bales, of which 2,647,310 bales came from Texas territory, including Indian territory; 2,753,838 from the other gulf states, and 3,260,456 bales from the Atlantic coast states. The grain movement towards the gulf is best measured by the total clearances of corn, wheat and oats from Galveston and New Orleans. For the first eight months of the current fiscal year these two ports contributed to export withdrawals 26,443,960 bu., compared with 35,696,872 bu. for the corresponding period of the preceding year. The shipments of pig iron and cast iron pipe in southern territory for February amounted to 148,910 tons, only 400 tons of which passed into export trade. The receipts of leaf tobacco at eight southern markets during February were the smallest in three years.

On the Pacific seaboard the receipts of produce at San Francisco are reported for a series of years, showing a decided increase in barley, oats, beans, rye and potatoes. The red wood lumber shipments from upper California exceed those of the preceding two years by at least a million feet. Thus far in the season, beginning Nov. 1, citrus fruit shipments have reached a total of 7,659 cars, mostly to eastern points, compared with 8,551 cars for the corresponding period of last season. Lumber shipments from Tacoma to coastwise points for the two months ending with February were 8,810,000 ft., and to foreign destinations 6,541,515 ft.

The coal trade on the Pennsylvania lines east of Pittsburgh and Erie to March 1 of this year amounted to 5,973,760 tons, compared with 5,623,646 tons a year ago. For the seven months ending with January, 1902, the Chesapeake & Ohio handled 3,301,843 tons of coal, 1,621,337 tons of which went to tidewater, compared with 3,042,378 tons a year ago, of which 1,505,448 tons reached tidewater. The Baltimore & Ohio coal and coke shipments for eleven months ending with February, 1902, reached a total of 18,617,872 tons. The average weekly shipments of Connellsville coke for the first nine weeks of this year were 10,465 cars, compared with 10,095 cars a year ago.

OUR EXPORTS AND IMPORTS.

The manufacturers of the country are now importing more than \$1,000,000 worth of materials for their workshops every day in the year, and are exporting more than \$1,000,000 worth of their finished product each day. The imports of manufacturers' materials in the eight months ending with February, 1902, were, according to a statement just issued by the treasury bureau of statistics, \$270,202,774, and the exports of finished manufactures during the same period were \$257,907,430. Thus in 243 days of the fiscal year the manufacturers have imported \$270,000,000 worth of material and exported \$257,000,000 worth of their finished product, thus averaging more than \$1,000,000 of both imports and exports for every day of the fiscal year up to the beginning of the present month. The importation of manufacturers' materials has been greater in the eight months just ended than in the corresponding period of any preceding year.

The following table shows the total imports of manufacturers' materials and exports of manufactures in the eight months ending with February in each year during the last few years. It will be seen that within less than a decade the importation of manufacturers' materials has more than doubled, and that the exportation of manufactures has also more than doubled:

Eight months ending with February.	Imports of manufacturers' materials.	Exports of manufactures.
1894	\$130,171,766	\$123,288,257
1895	169,868,576	116,828,996
1896	221,875,758	144,062,141
1897	159,533,502	174,180,920
1898	178,611,860	180,606,072
1899	170,959,002	206,822,334
1900	253,231,318	268,537,972
1901	213,077,923	269,866,656
1902	270,202,774	257,907,430

On the export side of the account manufacturers are showing an improved record. The bureau of statistics reports of exports of manufactures during both January and February show a decided increase over the corresponding months of 1901, the gain in the two months in question being more than \$3,000,000 over the same months of the preceding year. The exports of manufactures in the twenty-eight days of February were \$31,740,842, against \$30,302,592 in February, 1901. In practically all articles except iron and steel there has been a complete recovery from the temporary check in exports of manufactures noted a few months ago. Copper exports, for instance, in February of this year were \$4,210,861, against \$3,155,774 in February, 1901; though for the eight months the total still stands \$8,500,000 below that of the same period of the preceding fiscal year. Exports of refined mineral oils for the eight months ending with February, 1902, are \$44,689,987, against \$41,880,021 in the corresponding months of the preceding year. Even iron and steel exports show a marked improvement, the total for the month of February being \$7,358,296, against \$7,959,218 in February, 1901, and \$8,549,157 in February, 1900. For the eight months ending with February the exports of iron and steel manufactures are \$64,668,424, against \$81,575,685 in the corresponding months of the preceding year. Manufactures of cotton show an increase of \$9,000,000 over the corresponding period of last year; manufactures of leather, an increase of \$2,000,000; paraffin, which a few months ago showed a decrease, now shows a gain of nearly \$2,000,000 over the corresponding months of last year, while in nearly all of the other important manufactured articles exported there are gains over last year.

MARINE REVIEW

Devoted to the Merchant Marine, the Navy, Ship Building, and Kindred Interests.

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It is related in the story of Kimberley that a young Cape Colony settler and his wife, early in the seventies, trekked northward to the new town. The place was a mere name, but the diamond bed just discovered was the loadstone drawing a rush of miners and adventurers in search of fortune. The mining camp was reached and the pair entered a large tent where a general mess table was provided. The wife was the first woman there and the rough assemblage at once stood up to welcome her presence and gave her the place of honor. Her own claim was pegged out, and in a few days she found herself washing from the blue clay and grit the clouded yellow Cape diamond. On the claim adjoining a young Englishman was working whose delicate frame bore witness to the fact that he was in South Africa, like many others, to escape the scourge of English homes—consumption. This lad was Cecil John Rhodes, whose mighty soul has just returned from whence it came, and who is now, perchance, surveying from some haven of rest the scenes of its turbulent and restless life. There are many who are now throwing stones at Rhodes, an occupation which resembles unskilled labor since it requires no previous training, but Cecil Rhodes was undeniably great. It is seldom that such an awful and impelling force is ever concentrated in one man. When it is something has to give way. Usually it is the man, whose physical organism is at the best but a poor instrument to control such volcanic energy. Had Rhodes lived in an earlier age he would have been an emperor. As it was he was an empire builder. We believe it will be conceded that no product of the nineteenth century has, as a single, individual, human force gone further than Rhodes. He carried, as Rosebery says of Napoleon, human energy to its furthest reaches. And this life—titanic, colossal—is snuffed out at forty-nine. One cannot measure such men as these by ordinary standards. An analysis of really great men of action will almost invariably show that they are made up of tremendous faults. In Rhodes' ambition took the place of principle, or rather principle was subordinate to ambition. When this occurs energy has the loosest rein that it can ever have. The Jameson raid was condemned, said Rhodes, because it failed; and this remark shows how thoroughly he understood human nature. The raid was to him a protest against a form of government which he believed had no right to exist; but in his heart he must have been deeply vexed that Jameson had undertaken it without orders. There is an analogy between Rhodes and Bonaparte. One almost automatically recalls the other. Both were men of towering ambitions, the fruit of knowledge and opportunity. It was quite natural that Bonaparte, slender, well proportioned and tireless, should have been seized with a great, though limited, ambition, when he began to perceive his measureless superiority to other men. His powers were in full blaze in Italy and, indeed, from twenty-six to thirty-five years of age, he was a combination of heart and intellect such as the world has never known and probably never will know again. After that he seems to have lost control of the forces within him and his career became a succession of amazements—splendid, but amazements nevertheless and destined as surely for destruction as the rise and fall of the tides which but obey the changes of the moon. Bonaparte dreamed his dream at Toulon; and who knows that Rhodes was not dreaming his dream while he was working his claim adjoining that of the young wife at Kimberley. At any rate before he was twenty his life was purposeful. A few years later he put his hand on the map of South Africa and said: "This is my dream; that all red." He set out definitely to obtain the extension of British rule in South Africa. He realized that he could practically accomplish nothing to that end without money. He acquired wealth rapidly and honorably. He frequently said that a dirty dollar had never passed through his hands. Before he was thirty he was a multi-millionaire. But for wealth as wealth he cared nothing. It was merely for what he could do with it; it was only the means to an end. Having acquired it he set out upon his life work with the imperious, impetuous and savage haste of one who acutely realizes how brief life actually is. There was no time for dallying or for conciliation. The earth spun hot under his feet; opposition was beaten down mercilessly; and South Africa fairly reeled with the forces set in motion by this extraordinary man. He believed in the railway as a commercial and civilizing agent. He forced the railway into the Transvaal. In 1883 he entered the local parliament, elected by the joint votes of the Dutch and English, and in 1890 became the premier of Cape Colony. He endeavored to enlist the sympathies of the Transvaal in the commercial development of the whole of South Africa and projected the Cape to Cairo railway. He was goaded to desperation by the attitude of the Transvaal,

protesting that it was not compatible with sound sense. He insisted that the Transvaal would be the gainer by the flood of capital that would pour within her borders, as indeed it would, and as Canada will, if success crowns the efforts of Clergue and the millions behind him. He demanded rights for foreign capital that Kruger would not grant, and the first explosion was the Jameson raid. Rhodes never denied his complicity in that raid, or rather, his moral responsibility for it. As soon as he heard of it he resigned the premiership of Cape Colony and he stood by Jameson. But those who were with him in those few turbulent days knew how utterly broken in spirit he was. He had never intended that the protest against the action of the Transvaal should take the form of a raid. This was the beginning of the end of Cecil Rhodes. He never again held political office, but devoted his energies to the project of the Cape to Cairo railway, riding roughshod over opposition, moving restlessly from place to place and never remaining anywhere long enough to really establish a home. Never a well tempered man, the growing knowledge that a fatal illness was upon him made him irritable. His heart was not pumping blood steadily. When Sir William Harcourt in the parliamentary inquiry questioned him regarding the Jameson raid he frequently shrieked his answers at the astonished court, displaying an irritation that was out of all consonance with the provocation offered, the veins in his neck swelling and his face turning purple with surcharged blood. The truth is that during the late years of his life, in addition to the heart trouble, Rhodes had become a neurotic. He had worked under such tension that his nerves had seemed to press their way to the outside of his skin and the effect of the slightest curb was to send him into paroxysms of rage. He realized his condition thoroughly and during the last two years of his life denied himself to all callers, meeting only his business associates. His sole relaxation, when these fits of excessive irritability were upon him, was wild and heedless horseback riding. His hair had grown gray and his facial muscles lay in inert folds over his powerful features. But he was a very, very great man. The throwers of stones are now saying that he accomplished nothing and that his life was a failure. They said the same thing of Bonaparte. Before Napoleon the French peasant's eyes were fixed upon the ten feet of sod about him; after Napoleon they were fixed upon the stars. We are now in the midst of the whirl of events set in motion by Rhodes and it is not easy to limn him in a line. The world must admire his genius, energy and pluck, and whatever may be said of the right or wrong of the war in South Africa, there are those who will claim for him that what he desired to do was to open a continent not to the exploitation of one race but of all races.

A meeting of dredging companies was held at Chicago a few days ago to protest against certain stipulations in the present river and harbor bill which, it was held, provided for the establishment and maintenance of dredging plants at several points on Lake Michigan, Lake Superior and Lake Erie by the federal government. We find, however, upon examination, no such provision in the river and harbor bill, at least not with any such scope. We do find the following provision:

"The secretary of war is authorized to cause to be purchased or built a suitable dredge, for use in the improvement and maintenance of the harbors upon Lake Erie, at a cost not to exceed \$175,000, to be paid for from appropriations made in this bill as follows: From the amount to be expended for improving the harbor at Toledo, \$40,000; from Sandusky, \$40,000; from Cleveland, \$40,000; from Fairport, \$25,000; from Ashtabula, \$20,000; from Conneaut, \$10,000; and in case the total expense of said dredge shall be less than \$175,000 a proportional reduction shall be made from the amounts to be charged each harbor."

It is understood that this provision is inserted in the bill in order that the government engineer may have a convenient weapon to use against the "dredge trust." We use the words "dredge trust" advisedly because it seems that it was upon the representation that such a trust existed that the provision was inserted. There is no dredge trust, nor as far as we are able to discover, is there likely to be one. The business of dredging is not one which lends itself naturally to monopoly. Were all the dredging companies on the lakes to combine they could not have a monopoly because it would be possible for anyone, with even limited capital, to engage in the business of dredging. He would be sure to get plenty of work to do, too, if the combine attempted to do business at more than a fair profit. No combination, which does not control supply, can possibly succeed if it attempts extortion. Keen competition would inevitably follow. Brain and capital are to be had in abundance for any business which allows a fair profit. The disaster upon disaster which has followed so-called trusts, organized upon wrong premises, affords sufficient evidence of the truth of this. An attempt was made some time ago to form a combination of the dredging companies, but it was not crowned with success. Even if it was, it could not possibly control the dredging of the great lakes, though it probably would, through organization, have an advantage in securing contracts. But it would be only through doing business at a fair profit that it could possibly hope to live. We say this much because we do not believe that the provision in the river and harbor bill, quoted above, is justified by the facts. We are opposed to the provision, however, on quite another ground. It is no part of the function of the general government to engage in a private enterprise. Such departure is wrong in principle. The functions of the government are entirely public

and have to do with the state as a whole. The invasion of the field of strictly private enterprise might be warranted under extraordinary circumstances, though it is difficult to perceive what circumstances might arise wherein the state could not protect itself through the operations of the vast machinery of the law. At any rate the state is in no danger from the dredging companies of the great lakes which could afford it any possible excuse for invading the dredging field. Even as a common sense business proposition this provision should be stricken from the river and harbor bill. It is extravagance. Setting aside the initial investment for the dredge itself the work can be done more cheaply by private contract than it can by the government. It stands to reason that a private company whose sole business is dredging can do the work more economically than the government which doesn't have to mind the dollars and cents.

The first place among the world's living poets must be accorded to Mr. J. Pierpont Morgan. Indeed, we may say of him as Carlyle said of Burns, that "it were idle to call him the first of song writers since there is no one worthy to be called second." It may be surprising to many that Mr. Morgan should be classed among the poets at all. Some time since, in analyzing one of his acts in which it appeared to us that surpassing wisdom had been displayed, we declared him to be a distinguished statesman who had devoted his attention to business. But it is as a poet that Mr. Morgan commands our admiration. The chief quality of the poet is imagination. This is the first, last and great faculty of the poet, the amazing power of invention, the ability to conceive and create. We submit that even Shakespeare does not excel Mr. Morgan in the staggering proportions of a practical imagination. The ability to conceive the United States Steel Corporation called for an imagination of the most daring and original kind, fully as great, and far bolder, than that which called for the creation of Hamlet and Lear. The United States Steel Corporation as a compact, working organism is so vast that no one not gifted with the highest qualities of imagination could possibly have conceived it. Here is imagination, vaulting, splendid, pure and masterful. Neither music, nor literature, nor art, have ever called for a greater expenditure of this peculiar faculty, which is the special quality of the creative mind. The United States Steel Corporation, pursuing today its mighty operations as a unit on this continent, is as distinctively imaginative as the conceptions of Michael Angelo and Raphael and entitles Mr. Morgan to rank with these masters of old in the realm of imagination. The structures differ; the pigments vary; but the special faculty is the same. If anyone had spoken as late as three years ago of forming a company to buy out even the Lake Superior Consolidated Mines and the Bessemer Steamship Co. (Rockefeller properties) he would have been looked at askance. But if he added the Federal Steel, the American Steel & Wire, and one or two other similar properties, to say nothing of the great Carnegie organization, he would have been instantly dismissed as a driveling idiot. Back of the Consolidated Mines and the Bessemer Steamship Co. was the money of the richest man in the world. It did not seem reasonable that anything could be organized big enough to swallow even these two companies, especially as all but a few shares of their stock was owned by Mr. Rockefeller. But Mr. Morgan came along, fixed a fair valuation upon a dozen such properties, juggling with millions as though they were pennies, and to the astonishment of the industrial world had them all under his control with seemingly less effort than had previously been involved in organizing any one of them. Is not this a work of the imagination, pure and simple? A man without imagination of the highest character could not possibly have done it. Mr. Morgan is an industrial poet. The works of these leaders of thought and action go by various titles. One man's chef d'oeuvre may be called Paradise Lost, another's St. Peter's at Rome, a third's the Sistine Madonna, a fourth's the United States Steel Corporation. They differ in expression; they cannot be compared; but who is to say that they are not equal in degree?

The great American optimist is the chief of the bureau of statistics at Washington. Here is the undaunted heart. No circumstance nor procession of circumstances can wring his withers. Let our exports fall off a few hundreds of thousands or a million or so and this resourceful statistician has a variety of reasons, all comforting and consoling, for it. If Hawaii is only added, he says, our exports are greater than ever before; but Hawaii, being solemnly included by act of congress under the sheltering wing of the constitution, stoutly declines to be regarded even statistically as a foreign country. Nevertheless the chief of the bureau casts covetous eyes at its freight trade and always adds a special paragraph (we can almost hear him sighing as he does so) to his report to the effect that the year before last, when Hawaii was a dependency, it took such an amount of freight, which, if incorporated, would make the total export trade of the United States the greatest in its history. The bureau sometimes forgets that it is merely a chronicler of statistics and is called upon solely for figures and not for explanations. It must not, and should not, ever permit even the suggestion of a political bias to enter into its work. The moment it does this its figures are discredited. No matter how accurate they may be they cannot then escape suspicion. Possibly the bureau blows its horn unnecessarily loud over the export trade. It does not follow that an excess of imports over exports is an advantage; it is more than likely to be a disadvantage. Unless one buys one may not sell. That nation sells the most which buys the most.

STEEL CORPORATION'S EARNINGS.

At the regular meeting of the directors of the United States Steel Corporation this week the plan for retiring \$200,000,000 of preferred stock and issuing \$250,000,000 5 per cent. bonds was ratified, and was referred to a meeting of the stockholders to be held on May 19. The directors also declared the regular quarterly dividends of $1\frac{3}{4}$ per cent. on the Steel Corporation's preferred stock and 1 per cent. on its common stock. The preferred dividend is payable on May 15 and the common on June 30. The following financial statement, showing the earnings for the first year, was given out after the meeting:

NET EARNINGS FROM OPERATIONS FOR THE YEAR ENDING MARCH 31, 1902.

April, 1901.....	\$ 7,356,744
May, 1901.....	9,612,349
June, 1901.....	9,394,747
July, 1901.....	9,580,151
August, 1901.....	9,810,880
September, 1901.....	9,272,812
October, 1901.....	12,205,774
November, 1901.....	9,795,841
December, 1901.....	7,758,298
January, 1902.....	8,901,016
February, 1902.....	7,678,583
March, 1902 (estimated).....	9,700,000

Total net earnings.....\$111,067,195

The above net earnings were arrived at after deducting, each month, the cost of ordinary repairs, renewals and maintenance of plants, and interest on bonds and fixed charges of the subsidiary companies.

Less, amounts set aside for the following purposes, viz.:

Sinking funds on United States Steel Corporation bonds and bonds of subsidiary companies.....	\$ 3,059,913
*Depreciation and reserve funds.....	12,339,782
	\$15,399,695
Balance	\$95,667,500
Interest on United States Steel Corporation's bonds for year ending March 31, 1902.....	15,200,000
	\$80,467,500
Dividends for the year on stocks of United States Steel Corporation, viz.:	
Preferred, 7 per cent.....	\$35,682,832
Common, 4 per cent.....	20,309,601
	\$55,992,433
Dividends on outstanding stocks of subsidiary companies	25,350
	56,017,783
*Undivided earnings for the year applicable to increase "depreciation and reserve fund" accounts, new construction or surplus	\$24,449,717

Regarding the small total of February's net earnings, a director said that it had been due both to the fact that there had been but twenty-eight days in the month and to floods and bad weather. Of the preferred stock conversion plan the statement was made that the Steel Corporation's management wanted it distinctly understood that the plan will not be compulsory on any stockholder. No one need exchange his stock except on his own volition. Incidentally it came out at the meeting of the directors that the subsidiary companies have in the aggregate a surplus of cash of \$56,000,000. This, with the \$50,000,000 which will be raised by the sale of United States Steel Corporation bonds, will give the corporation \$106,000,000 in cash to use as the management may see fit for the best interests of the company.

COALING AT SEA.

The British admiralty has recently made some further interesting experiments in coaling at sea with the marine cableway, obtaining most satisfactory results. The following is from the London Times:

"The Trafalgar has had a number of sea trials with the collier Muriel in coaling at sea. The Muriel was attached temporarily to the reserve squadron and tests made to establish the safety and capacity of the marine cableway at various speeds and various conditions of sea and weather. A test took place while speeding at 11 knots and 35 tons per hour were transhipped. At one time in 33 minutes 21 tons were put across, which rate continued would have meant 40 tons per hour. The test took place in a half a gale of wind, which seemed to have no effect on the capacity of the machine. The course of the ships was frequently altered, making sharp turns to test the gear. All of such trials showed that the device had ample strength and the ability to accommodate itself to any pull of the lines, however sudden. The receiving gear was transferred to the Empress of India, and although the officers of this ship had no knowledge of the working of the device they were able to take 35 tons per hour. At one trial Vice Admiral Sir C. H. Noel had his fleet of seventeen ships form in two lines and steam slowly past the battleship being coaled, so that the officers might have an opportunity of witnessing the experiment."

The British experiments have gone further than the American experiments. The United States navy coaled at 6 knots 20 tons per hour. The British have increased the towing speed to 11 knots and doubled the capacity delivered to 40 tons per hour. The United States navy is now, however, equipping the battleship Illinois with a Lidgerwood-Miller marine cableway, which does not take up a single additional foot of deck space, but is nevertheless expected to enable the Illinois to take coal from any masted ship it may meet in any quarter of the globe.

A new steamer building at the yards of the New England Co., Bath, Me., for the Kennebec division of the Eastern Steamship Co. will be named Ransom B. Fuller in honor of the president of the new consolidated steamship line.

CONSTRUCTION OF TORPEDO BOATS AND DESTROYERS.

By George Herbert Wilson.

Resuming with hatch details and fittings I will take up the automatic hatch latch. The automatic hatch latch is a fitting which has improved the conditions in the fire room and engine room of these boats and has made the work of the firemen and engineers a great deal safer. By the mere pulling of a lanyard the hatch or skylight covers immediately fly open to their full extent and remain so, allowing the steam to escape and affording a ready access to the deck above in case of accident. From the fact that this type of boat is building at various yards all over the country this detail has been gotten up in several styles, all efficient to be sure, but some more so than others, with the extra advantage of being lighter in weight and cheaper to work. The several methods employ a bolt or bolts, operated by a spring and released by a bell-crank catch, to which is attached the lanyard leading to the space below. To close the covers it requires but an extra "bang" to cause the bolts to shoot back, and the springs acting upon them, cause them to be caught under the latch crank, ready for opening at the pull of the lanyard. These covers are fitted with springs and carriage-hinge stops and fly open to, and remain in a vertical position.

In locating the hatches in the main, or upper deck on these boats, it is well to consider at the same time the probable location of the hatches in the lower or platform deck leading to the magazines and store rooms, so as to locate the one over the other for reasons which I will presently explain. If the hatches are so located, the hatch in the lower deck will come under the ladder leading to those quarters from the upper deck and will not form a stumbling block for the men, being well out of the way and not taking up the floor space. The upper hatch, being directly over the lower, the easy handling of ammunition and stores will be assured. A small portable hatch crane on the upper deck is generally provided for this purpose. By an ingenious arrangement of stowing the ladders when handling stores or ammunition the hatch can act as a gangway at the same time. The arrangement I refer to is a very simple one and consists of swinging the ladder in an arc of a circle, the foot of the ladder being the center or fulcrum. The length of the ladder is such that its upper end can swing from its normal inclined position to a position nearly vertical, in which position it is secured to extra clips on the hatch beam provided for that purpose. When in the latter position the handling of material can take place and at the same time the ladder affords access to the deck above. The ladder referred to is, of course, a metal one, as wooden ladders should have no place on boats of this class. The ladders are made up of pipe sides with rounds of iron bars riveted through the two sides. Special fittings for the feet and head are necessary. The lower deck hatches are of no great importance except to make them water-tight and to provide a suitable locking arrangement. Where it is absolutely necessary to locate them out in the floor space they should be as nearly flush as possible.

AIR PORT OR SIDE LIGHT.

Among the various details which go to make up a good and servicable boat none are so important as the air port or side light. In view of the quartering of the crew and the petty officers in these boats in berths along the sides of the vessel, in tiers of two and three, the side lights must be considered in connection with the same. With this arrangement in mind the author discovered that in some cases, to allow for the proper opening of the hinged port, the upper tier of berths would have to be moved inboard some 12 or 14 in. for an 8-in. air port. Allowing this on each side of the boat, the head room and consequently the floor space was reduced by a matter of from 2 ft. to 2 ft. 4 in. for the length of the space. This is a great disadvantage where the boat has nearly straight sides or has a tumble-home, which was the condition in the case cited, as the quarters on the boats are cramped enough. To obviate this the author originated the sliding air port, which is being used on six of the new destroyers with very good results. This port consists of the ordinary frame without hinge or clamp lugs, but having a boss cast at the top and bottom of the frame to receive two studs. The frame carrying the glass light is cast with a lug at top and bottom to work on these studs. The upper lug of the frame is drilled to revolve on the upper stud and the lower lug is cut away on one side in a horizontal U shape to allow the frame to revolve about the upper stud. Two clamp nuts, working on the studs, secure the frame water-tight. The upper clamp is provided with a thimble which, with unscrewing, carries the glass frame inboard, so that the rubber clears the outer frame and the port is free to slide around and is held in its open position by a sheet-brass spring catch. Where a deadlight is required the frame carrying the glass is threaded on its inner edge to receive the screwed-in cover. The space required to work the light is merely the length of the two stud bolts, allowing the berths to be worked close in to the frames. The light has been tested for water-tightness and has proved absolutely tight. The weight of this type of air port is a great deal less than that of the hinged cover and deadlight type.

The question of lights being under consideration the deck light and its functions should be dealt with. The deck light has come to be looked upon as an evil only to be used where absolutely necessary. As a means of ventilation, with the drop light style, it should be discarded entirely. The cause of this protest against the use of deck lights is mainly that they are all the time leaking, and when they are let down in opening the water held in the recess made by the frame is dashed over the operator. The small drip cocks do not take away this water and besides are a nuisance to operate under any condition. As a means of lighting an apartment they are hardly worth installing, for in a short while the light is filled with dirt, the glass scratched and its relatively small area of lighting surface decreased, while the cleaning of them involves additional work. The only deck lights that should be fitted are those of the permanent type, and they should not be fitted in quarters or living spaces. In the boats under my supervision they have been fitted in the coal bunkers and over the fire rooms and in some cases in water closets or shower baths which had no side lights. The rectangular prismatic lights were fitted and were found to give general satisfaction.

VENTILATION AND DRAINAGE SYSTEMS.

There are two very important systems in these boats, namely, the ventilation and the drainage systems. Although these boats are small in comparison to their sister ships in the navy, they require just as much

thought in regard to these matters. The ventilation system should be made very simple and kept down to the smallest affair consistent with an efficient service. If it could be managed, the mechanical system, one forward and one aft, would be very efficient and would do away with the nest of ventilators and exhausts generally scattered over decks of these boats. The mechanical system could be arranged to take air from one large ventilator near the bridge forward, and near the after conning tower for the after system, the induced air to pass through a coil of pipes, this coil to be heated by steam in winter, giving fresh, warm air in the cold season and fresh cool air in summer. A main exhaust leading to the smokestack, with branches to the various compartments will carry away the foul air. When under way the use of the induction fan could be dispensed with and natural draft used. The main disadvantage of this system is the probable constant running of a blower motor or engine.

The principal advantage to be gained by this system is the few ventilators required. When it is remembered that these ventilators are located all around the deck, forming obstructions to a good passageway, and when in action it is required to unship and stow them wherever possible, their use is a hard proposition, considering their number and the bulkiness. With this system the sanitary conditions can be improved, as the air can be purified and cleansed before delivery and all the foul air is carried away by reason of the enforced circulation. Another great advantage is the elimination of the great number of steam heating pipes, together with their necessary radiators, valves and cocks; the repacking, repairing and attendance necessary to the same is likewise done away with. During a heavy rain, or in a big sea, this system can always be used, while the average deck ventilator would have to be closed if not carried away by a heavy sea.

If the deck ventilator system is used there are, however, several points which are of great importance and will bear discussion. The shape of the mouth of these ventilators should be such that it takes up the least amount of deck room consistent with its size. The old style of cowls with wide flaring mouth has been displaced in a great many boats by a long mouth with about the diameter of the pipe for the width. All the ventilators should be arranged to turn so as to take advantage of every direction of the wind. When ventilators are located abaft of the smokestacks, a dust screen worked over the mouth of the cowl is a great improvement. Small heaps of coal dust were found under a great many of the after ventilators, but this can be avoided by the use of the dust screen. The method of closing the ventilator from below has received considerable thought and great improvement has been made along this line. In place of the old style of drop-hinge cover a screw-up cover has been devised which has many points of advantage over the old style. The frame at the deck is provided with three arms which carry a screw-rod which in turn carries the cover. A handle at the lower end of the rod provides means for operating. The cover is shaped like a flattened cone and a ground joint between it and the frame makes an absolutely water-tight arrangement. The advantages of this style of cover is that the supply of air can be regulated by the manipulation of the screw-rod. The air instead of coming directly down, as in the other styles, and causing a disagreeable draft, is made to enter the compartment by reason of the convex surface of the cover in a horizontal direction, radiating from all points of the ventilator. A customary flap valve at the bottom of the ventilator pipe allows for the drainage of accumulated water, and from the shape of the cover nearly all of such water must drain off, making the opening of the cover a safe undertaking.

The drainage system of these boats should be made as simple and efficient and with as few pipes as possible. This system should be divided into three parts, namely, forward, aft, and machinery space. A manifold should be located in the compartments next but one to the machinery space forward and aft, with branches leading to the bilges of all the compartments in those parts of the vessel. Pipes should also be led from the manifolds to the auxiliary feed pumps. The branches leading into the bilges should be about 2½ in. in diameter and the branch to the pump about 3 in. This will take care of the forward and after part of the boat, with the exception of the extreme end compartments, which should be drained by means of sluice valves into the adjacent compartments.

The drainage of the machinery spaces (boiler and engine rooms) should be accomplished by means of a larger main leading to the feed pumps and to the circulating pumps. This main should be about 5 in. or 6 in. in diameter, with 3½ in. or 4 in. branches to the bilges. Maccomb strainers should be placed on the branches leading to the circulating pumps and basket strainer boxes should be fitted on all ends of bilge branches, as close to the skin plating as possible. All valves and manifolds should be arranged to operate from the deck above or from an accessible high location in the compartment, by means of rods and wheels and deck boxes. All deck boxes and hand wheels should be marked for the compartment which they drain. Valve rods, manifold rods and sluice rods should operate in the same direction as a screw operates, turning to the right to close and to the left to open. Bilge ejectors should also be fitted in the machinery spaces to take out the bulk of the water.

ARRANGEMENT FOR CARRYING THE ANCHORS.

The arrangement for carrying the anchors on these boats has room for improvement, and in two of the destroyers now building, which were for a time under my supervision, an entirely new feature in this line has been worked out. Instead of carrying the anchors (the stockless type) in a fore-and-aft position, resting on "bill-boards" on the turtle deck, a recess was made in the round of this deck and the anchors carried in a slanting athwartship position, the flukes being down. The shackle at the end of the stock was secured to a specially-designed anchor trip. This method, although more expensive to install, has enough advantages to compensate for the expense involved. By stowing the anchors in these pockets, they are clear from the fire of the forward starboard and port guns. They are more readily stowed and the tripping arrangement is much simpler. From their stowed position they will "cast" easier and with much less danger to the side of the vessel than in the former method. The anchor davits should be made portable so as to unship in time of action, giving the guns previously mentioned a clear line of fire with a considerable degree of depression.

For the handling of the torpedoes the practice has been to supply a rather cumbersome davit or crane, much to the disadvantage and inconvenience of the working of the boat's crew. I would suggest that a small plain davit with nothing but an eye at the head be fitted. A differential pulley of approved make can then be hung in the eye of the davit, which will supply the power for the raising of the torpedoes. By this method one man can transport the davit and pulley from place to place. Of course extra sleeves and steps must be supplied where needed.

STOWAGE OF BOATS, GRATINGS, ON DECK, ETC.

The stowage of the small boats on these craft is a much discussed question and there are still some doubts in my mind as to the necessity of carrying more than one small boat for landing purposes. When the torpedo boat or destroyer is in action there is very small chance that the small boats will not be rendered unseaworthy by the enemy's small-gun fire. One good boat and several life rafts would be more servicable under the circumstances. It is preferable, when boats are carried, to carry a few large boats to a larger number of small ones, on account of handling and stowing. It is inadvisable and somewhat dangerous to carry the boats in the davits, so they must be carried on the deck. To carry out the idea of a clear fore-and-aft gangway, mentioned in a previous article, the boats must be carried inboard, resting in roller chocks on the deck. These chocks can be lashed securely in place and rolled over to the rail when the boats are to be lowered. In handling the boats, care should be taken that as little as possible of the rail and awning gear be disturbed. To this end the davit should clear the awning ridge rope in its swing and the rail for the length of the boat be made portable so as to drop over the side; one awning stanchion and part of an awning spreader will also be affected. Extra strong pipe drawn out to a smaller diameter at the head, in which an eye is welded, makes a very strong and nice looking davit. A davit is one of the fittings requiring neatness in design, combined with the necessary strength.

In the matter of gratings around the deck and platforms a very great improvement has been made. The great trouble with wood gratings has been that they split and warp, no matter how the wood is seasoned. They also form excellent material for "splinters" in time of action. To take the place of these gratings I devised a specially-punched plate which has given great satisfaction. The plates used were about $3\frac{1}{2}$ lbs. per square foot and were reduced to $3\frac{1}{4}$ lbs. by punching. The holes were made by a punch 1 in. in diameter working in a countersunk die $1\frac{1}{16}$ in. in diameter. The difference in the size of the punch and the die makes a hole with a turned-up "lip" or "flange" and the countersink in the die gives good backing for the punch, so that a clean hole is the result instead of a ragged edge, which is always made by the ordinary enlarged die. The "lips" around the holes, which were spaced about $3\frac{1}{2}$ in. between centers, form a non-slipable surface and materially stiffen the plate. The shape of the gun platforms around the conning towers, with their radial brackets, allows of a very good construction by the use of these plates. These plates are worked in the shape of a sector of a circle and are riveted to the bracket angles and to the margin plate around the circumference of the platform. The whole affair, when riveted, makes a very rigid construction and is a great improvement over the portable wooden gratings. The important advantages of this method are durability, saving of weight and a great decrease in cost. I would recommend in place of any of the gratings or non-slipable materials such as linoleum, rubber, etc., placed on or cemented to the decks of these boats along the gangways, etc., that a very light metal plate, punched in this manner, be fitted and secured to the deck plating by a few set screws. I have gone into this matter pretty thoroughly and find that a saving in cost and weight would be the result as well as longer life of material.

Regarding the question of a good hand rail stanchion or an awning stanchion, or a combination of the two, I have yet to see one that will answer all the requirements without costing too much to make, looking unshipshape or having a multiplicity of working parts to get out of order. To be sure the requirements that these stanchions have to fill involves some of the features mentioned, but I think that a type will be devised sooner or later which will give better satisfaction than those at present used.

GENERAL CONCLUSIONS.

Upon a review of the articles upon the subject chosen for the head of this series it would seem that the field has been pretty thoroughly covered as far as my experience in this particular line will allow. It remains for my brothers in the profession and specialists in this line of work to bring out discussion along the line of this subject or upon any points or theories contained herein. In closing I would say that the torpedo boats and destroyers of this country are superior in more ways than one to the foreign-built boats. In one point especially they have a decided advantage, although it had to be gained by the sacrifice of another good feature. I refer to the structural strength of our boats, which is away ahead of that of the boats built abroad. But this extra strength entails extra weight and a certain amount of speed had to be sacrificed if we are to believe the latest reports of the navy department. The question in my mind is, Should we not have gained enough experience from abroad and from our past mistakes to have designed a more-nearly-perfect boat without having to resort to the sacrifice contemplated by the department?

There is one more point that will bear touching upon and that is as to who should build these tender machines. Surely not the man or firm who has not seen such a boat, and yet we have had practically some such cases. Neither has an inexperienced firm any right to undertake such work as some have learned to their regret. Had we a firm in this country like Thornycroft, Yarrow or Schichau, all of whom have made a specialty of this work for a number of years, the results would have been better, but as it is the outlook for this type of boat is rather doubtful. To add to this dilemma, the contractors who have turned out boats successfully as far as the boats are concerned, but not as regards finances, are firm in their determination to leave these boats entirely alone in the future. There is one remedy to be suggested and that is to build them at one or two of the navy yards best suited for the purpose. The collection of data as regards these boats in the hands of the navy department, together with the presence of several of the boats in question at the navy yards, would materially assist the design and construction of a future fleet of torpedo boats and destroyers.

PRODUCTION AND CONSUMPTION OF SUGAR.

"The World's Sugar Production and Consumption, 1800-1900," is the title of a monograph just issued by the treasury bureau of statistics. It discusses the sugar production and consumption of the world during the past century and especially during the last half century in which the burden of sugar production has been transferred from cane to the sugar beet, and in which the world has so largely increased its consumption of sugar. The world's sugar production has grown from 1,150,000 tons in 1840 to 8,800,000 tons in 1900. During the same period the world's population has grown, according to the best estimates, from 950,000,000 to about 1,500,000,000. Thus, sugar production has increased about 650 per cent. while population was increasing but about 50 per cent. Coming nearer home and considering the United States alone, it is found that the consumption of sugar, which in 1850 was only 22 lbs. per capita, was in 1901 over 68 lbs. per capita. One especially striking fact shown by the statistics presented in this study is the rapidly increasing proportion of the world's enlarged sugar consumption which is supplied by beets. According to the figures presented by this study, beets, which supplied in 1840 less than 5 per cent. of the world's sugar, in 1900 supplied 67 per cent. of the greatly increased consumption; while cane, which then supplied 95 per cent. of the world's sugar consumption, now supplies but 33 per cent. Stated in quantities, it may be said that the world's cane sugar supply has grown from 1,100,000 tons in 1840 to 2,850,000 tons in 1900, an increase of 160 per cent.; while that of beets has grown from 50,000 tons in 1840 to 5,950,000 tons in 1900, an increase of 11,800 per cent.

The figures above quoted include that portion which enters into the world's statistical record of sugar production, and does not include the large quantities of cane sugar produced in India and China exclusively for home consumption, and in a considerable number of the tropical countries does not include that portion of the sugar consumed at home. Even if these figures of cane sugar production for home consumption were obtainable, the production from beets would still show a much more rapid growth during the last half century than that from cane. This is, apparently, due to two great causes—the elimination of slavery in the tropics, the seat of the principal sugar production, and the intelligent study of, and government aid to the production of beet sugar in the temperate zone, especially in European countries.

One effect of this enormous increase and the competition which has accompanied the developments above alluded to has been a great reduction in prices to the consumer. The figures of the bureau of statistics obtained from statements supplied by importers of the cost in foreign countries of the sugar which they import show that the average cost of the sugar imported in 1871-2 was 5.37 cents per pound, and in the year 1899-1900, 2.49 cents per pound. The sugar production of France has grown from 23,000 metric tons in the sugar year 1839-40 to 805,000 tons in 1899-1900; that of Germany, from 12,659 metric tons in 1839-40 to 1,875,000 tons in 1900-1901; Austria-Hungary, from 25,000 metric tons in 1853-54, the earliest date for which figures are obtainable, to 1,120,000 tons in 1899-1900; Russia, from 19,000 metric tons in 1853-54 to 900,000 tons in 1899-1900; Belgium, from 12,000 metric tons in that year to 300,000 tons in 1899-1900; Holland, from 1,000 metric tons in 1860-61 to 180,000 tons in 1899-1900. Turning to the cane sugar producing areas, in which the statistics are not available for so long a period, it is found that the exports from the Philippine Islands increased from 23,416 metric tons in 1849 to 233,000 metric tons in 1896. From Cuba the exports in 1860 were 537,491 tons, and in 1894 968,750; in Hawaii the production has grown from 11,200 tons in 1875 to 243,470 tons in 1899. Java produced in 1884, 338,866 tons and in 1901, 765,000 tons; and Brazil, which in 1884 produced 268,335 tons, produced in 1901, 215,000 tons.

The table which follows shows the world's production of sugar from cane and beets, respectively, at decennial years from 1840 to 1900, and the percentage supplied by beets:

Year.	Cane sugar, Tons.	Beet sugar, Tons.	Supplied by beet, per cent.
1840	1,100,000	50,000	4.35
1850	1,200,000	200,000	14.29
1860	1,510,000	389,000	20.43
1870	1,585,000	831,000	34.40
1880	1,852,000	1,402,000	43.08
1890	2,069,000	3,633,000	63.70
1900	2,850,000	5,950,000	67.71

FRENCH TORPEDO BOATS.

The twin-screw torpedo boats Bourrasque and Rafale, recently delivered at Cherbourg to the French government by M. Normand & Co., of Havre, are of the Cyclone unprotected class. The dimensions are: Length on load line, 147 ft. 6 in.; extreme breadth, 16 ft. 7 in. The weights carried on trial, exclusive of chains, anchors, masts, boats, etc., and comprising only torpedoes and torpedo tubes, compressing pump, artillery and ammunition, provision water for boilers and crew, coals necessary for steaming 1,020 nautical miles at 14 knots—as determined by an eight-hour preliminary trial—crew and effects, provisions, including 4.2 tons for sundries, amounted to 34.5 English tons in the Bourrasque and 39.2 tons in the Rafale, the displacements being respectively 153.3 and 158 English tons. The full-speed trials, which took place after the ordinary preliminary runs on the measured mile, were of four hours' duration, one hour of which was to be run at 25 knots minimum, one hour at maximum speed, and the next two hours at 25 knots. The one hour maximum speed was 31.53 knots for the Bourrasque and 31.41 knots for the Rafale, the mean of the three other hours being 25.79 knots and 26.20 knots respectively. The boilers are of the Normand type, the engines being, as usual, fitted with feed heaters, cylinder relief valves, water filters, etc.

Of \$30,000,000 which the Steel Corporation is to spend for improvements, \$10,000,000 will be devoted to enlargements in the works of the National Tube Co. Additions to the armor plate plant at Homestead, a new angle mill and a structural and fitting works at that point, and additions to the plants of the American Bridge Co., will take up a large part of the balance of the appropriation. It is said that the Bessemer railroad (Conneaut to Pittsburgh) will also come in for improvement on a large scale.

AROUND THE GREAT LAKES.

Capt. J. M. Fields is again on the lakes looking after the sale of his course finder.

At a meeting of the executive committee of the American Ship Building Co. in Cleveland Monday the regular quarterly dividend of 1 3/4 per cent. on the preferred stock was declared, payable April 15.

Mr. John J. Long of Collingwood, vice-president of the Northern Navigation Co., announces that Mr. A. B. Pratt has been appointed assistant manager of the Northern Navigation Co., and that Mr. William Askin has been appointed assistant manager of the Northwest Transportation Co. of Sarnia.

Capt. William H. Rolls, one of the pioneer vessel masters of the lakes, died at his home near Romeo, Mich., last week. For many years he had been identified with Alger, Smith & Co. Owing to his failing health he retired to his farm two years ago. The death of Capt. Henry Durand, another old lake master, is announced from Milwaukee, and from Toledo comes report of the death of Capt. Joseph T. Skeldon, who brought out the David Dows, a well-known five-masted wooden schooner.

The Cleveland-Cliffs Iron Co. has secured a fifty-year lease on the Negaunee mine of Negaunee, Mich., and will take charge of the property at the expiration of the option, Oct. 1, 1903, at present held by the United States Steel Corporation. The Cleveland-Cliffs company recently acquired much valuable mineral property adjoining the Negaunee, upon which they have already begun the work of development after proving the existence of a vast body of high grade Bessemer ore. The price paid for the lease of this mine was undoubtedly a very large sum. The fee owners will receive a royalty of 30 cents a ton.

Mr. John Marron, Cleveland agent of the Erie & Western Transportation Co. (Anchor line) makes the following announcement under date of April 1: "We expect our first boat to leave Cleveland for Lake Superior ports about April 15, and we are now prepared to receive freight for Detroit, Sault Ste. Marie, Marquette, Houghton, Hancock, Dollar Bay, West Superior and Duluth, and points on the Duluth, South Shore & Atlantic railway via Marquette, and points on the Northern Pacific railway, Great Northern railway, Chicago, St. Paul, Minneapolis & Omaha railway and Duluth & Iron Range railway; also points in Manitoba and British Columbia via Duluth."

On Saturday last the American Ship Building Co. launched one of the large bulk freight steamers building at its Cleveland yard, and on Wednesday a similar vessel at West Bay City, while two launches are set for Saturday next. The steamer launched in Cleveland Saturday is a Mitchell boat, a duplicate of other 6,000-tonners of that fleet. She was named James Gayley. The steamer launched at West Bay City is for W. A. Hawgood and others of Cleveland. She is 434 ft. over all. She was named Bransford. At South Chicago, Saturday, the steamer Luzon, building for E. D. Carter of Erie, will be dropped into the water and the Steel King, the last of the steamers building for Mr. J. C. Gilchrist, will be launched at Lorain. These are 5,000-ton vessels.

ADDITIONAL LIGHTS AND FOG SIGNALS.

During the past week Capt. George P. McKay, chairman of the committee on aids to navigation of the Lake Carriers' Association, and Harvey D. Goulder, counsel for the association, went to Washington and presented to the light-house board and to the proper congressional committees the list of additional lights and fog signals needed on the great lakes. There are now only a few places where lights of an expensive kind, involving large structures, are sought by the vessel men. These are: Crisp's point, 15 miles west of Whitefish on Lake Superior; Rock of Ages on Isle Royale, Lake Superior; Middle island, Lake Huron, and St. Martin's reef, Lake Huron. It is suggested that a lightship be constructed for St. Martin's reef, pending an appropriation for a permanent structure. Capt. McKay feels quite confident, as a result of the Washington visit, that the light-house establishment will provide before the close of the present season of navigation storage tanks for gas at Stannard rock, Passage island and other isolated points on Lake Superior, so that lights may be shown from such places for some time after the keepers are forced to leave. He is also of the opinion that funds will be provided so that the light-house board may relieve the vessel owners of the expense of maintaining a light ship in Pelee passage, Lake Erie. Of course a very large number of gas buoys for channels and shoals in different parts of the lakes are still badly needed. The lighting of the Toledo straight channel in this way is especially important. A long list of places where gas buoys could be used to great advantage was submitted to the Washington authorities.

LAUNCH OF THE HELENITA.

Frank J. Gould's steam yacht Helenita was launched last week from the works of the Gas Engine & Power Co. and Charles L. Seabury & Co., Consolidated, Morris Heights, N. Y. The principal dimensions of the Helenita are as follows: Length over all, 185 ft.; length on water line, 154 ft.; extreme breadth, 22 ft.; depth, 12 ft.; draught, 9 ft.; displacement, 350 tons; speed, 19 knots; indicated horse power, 1,000. The motive power is supplied by a Seabury triple-expansion engine. The cylinders are respectively 13 1/2, 21 and 24 in. diameter with a stroke of 21 in. There are two Seabury water-tube boilers with a combined heating surface of 3,748 sq. ft. The electric plant is very complete and provision has been made for electric as well as steam heaters. Electric fans will be used in the state-rooms and cabins. The Helenita is well equipped in case of accident, as provision has been made for four boats as follows: One 26-ft. naphtha launch, built entirely of mahogany and equipped with a 6-H.P. engine; one 21-ft. launch; one 20-ft. gig, and one 20-ft. cutter. The Helenita was designed by Mr. Charles L. Seabury and is constructed throughout of steel. There are two deck houses—one forward and one aft. The forward house contains the dining room, smoking room, captain's stateroom and steward's pantry. The after house is fitted up as a music room and social hall and all the finishing is of mahogany, inlaid with marquetry work. The furnishings throughout are most luxurious.

The Portland Ship Building Co., South Portland, Me., has just launched the fishing schooner Albert D. Willard for Capt. John Willard. The vessel is 70 ft. long, 17 ft. 6 in. wide and 9 ft. deep.

SMOOTH-ON IRON CEMENTS

SMOOTH-ON

will make a leaky casting steam tight, and the way it cures such defects as blow holes, shrink holes and other common blemishes is a revelation.

SMOOTH-ON

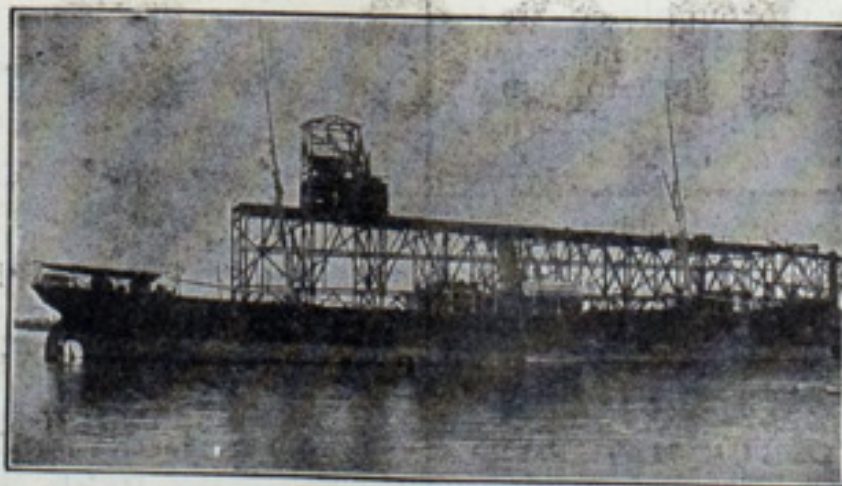
is not a mere filling. It is a dry, metallic composition, which, upon being mixed with water, becomes a hard metallic iron that is insoluble in water, petroleum or other oils, that will stand an intense heat; and the expansion being the same as iron, is why it is sometimes called Magic iron. When applied to a blemish in a casting by a skilled mechanic, the blemish is removed.

Hundreds of breaks or fractures in Hydraulic machinery, leaks in connections in steam or water work have been permanently and cheaply repaired with Smooth-On.

Write for 60-page illustrated catalogue showing wonderful results obtained with and telling all about the different Smooth-On products.

USED BY STEAMSHIP

engineers, steamboat engineers, ship builders and by the U. S. Navy in place of white and red lead and iron borings.



We are analytical chemists---
water, oil, iron, etc.

SMOOTH-ON IRON CEMENTS

Unequaled for Boiler Patching and Stopping Leaks of Steam, Water or Oil.

S.S. "Santuit,"

Norfolk, Va., Jan. 16, 1901.

H. B. Saunders, Esq., New York, N. Y.

Dear Sir:—In answer to yours of January 4th, I wish to state that Smooth-On Compound is the very best cement that I have ever used, and I can safely say that had I been without it I could not have continued with boilers without considerable interruption; and furthermore state that during my experience of 30 years in ships of several nations, I have never found anything to equal it, and I can without hesitation safely recommend it to any one that is troubled with leaky boilers, as I am positive that if they give Smooth-On Compound a fair trial they will receive the same good results from its use that I have.

Yours faithfully,

A. CARLSEN, Chief Engineer,
S.S. "Santuit," Norfolk, Va.

SMOOTH-ON MANUFACTURING COMPANY
547-549 COMMUNIPAW AVE., JERSEY CITY, N. J. U.S.A.
VREELAND TOMPKINS, CHEMIST AND MANAGER.

DEATH OF GEORGE PRESLEY, SR.

One of the grand old men of the great lakes, George Presley, Sr., died very suddenly last week while making a call at the home of a friend. It is a singular fact that the old gentleman always said that he would die away from home. He had been troubled with heart disease for many years, and it was his conviction that it would seize upon him at some unexpected time. For this reason he always carried a heart stimulant with him, but the call was so swift that he was taken while his fingers were fumbling for the medicine. He had made his home with his son, George Presley, Jr., at No. 140 Clinton street, for the past two years, but he died at the home of Mrs. Rose Richards, a widow, who lives at No. 681 Gordon avenue. Mr. Presley was eighty-two years old. He came to Cleveland in 1843 and at once engaged in ship building. He was at first a member of the firm of Stevens & Presley, builders of a number of the large lake carriers. He built the Globe dry docks and until his retirement was the head of the Globe Dry Dock Co. Four years ago Mr. Presley and his wife celebrated their golden wedding, but the wife passed away two years ago.

IMPROVEMENTS IN NORTHWEST AND NORTHLAND.

Rapid progress is being made at Buffalo with the alterations in the big Northern line passenger steamers Northwest and Northland, which include new Scotch boilers and other changes, estimated to reach a cost of nearly half a million dollars. The Buffalo Forge Co. of Buffalo will do a part of the work. On each boat there will be in duplicate generating sets for electric lighting, consisting of two horizontal tandem compound engines made by the Buffalo company, direct-connected with General Electric marine type 75 K. W. generators. The engines are of the Buffalo company's latest type, and are especially designed for this contract, the space available being limited. The engines are to be delivered in an extremely short time. The steamers are also being fitted with improved ventilating apparatus for maintaining the air in all portions of the vessels uniformly cool and pure at all times. Six Buffalo steel plate fans with direct-connected General Electric motors will be installed in each steamer with an elaborate network of galvanized iron ducts for delivering the air. This system will be when completed in perfect accord with the balance of the magnificent equipments of these splendid vessels.

George H. Hitchings has laid the keel of a wooden schooner at his ship yard in Hoquiam, Wash. She will be a duplicate of the A. F. Coates. Her dimensions will be 195 ft. over all, 37.5 ft. breadth of beam and 13.5 ft. depth of hold. She will carry 750,000 ft. of lumber. She will be owned by the E. K. Woods Lumber Co.

Thomas W. Lawson is the name selected for the seven-masted steel schooner, the first to be constructed anywhere in the world, and which is building at the works of the Fore River Ship & Engine Co., Quincy, Mass.

TRADE NOTES.

Pittsburgh offices of the Niles-Bement-Pond Co., manufacturers of machine tools, are now in the Frick building.

Mr. Sidney L. Smyth of New York has purchased through Frank N. Tandy of Boston the 46-ft. sloop Milicete. This yacht was designed by the late Edward Burgess, and for the past three seasons has been owned by Mr. Gilmer Clapp of Boston. The Milicete will be fitted at Lawley's and will be delivered in New York about June 1. Mr. Smyth intends to use her principally as a family boat, but will race the yacht in the class for cruising 46-footers in lower New York bay when the opportunity affords.

Mr. E. P. Gould, well known to engineers around the lakes, is now with Morgan & Wright of 331-39 West Lake street, Chicago, manufacturers of rubber goods. Mr. Gould is to look after the marine trade for Morgan & Wright, who make all kinds of mechanical rubber goods. He will spend the greater part of the summer as chief engineer with Commodore Morgan on his fine steam yacht Pathfinder.

The Truscott Boat Manufacturing Co., St. Joseph, Mich., has just issued a splendid catalogue devoted to their motors. The company says in its introduction to the catalogue: "The contents of this catalogue cannot fail to be of particular interest, showing as it does a line of marine motors to suit any and all conditions, climates, class or size of boat. These motors represent leaders of their types, devoid of the untried ideas that live only to be laid aside when found wanting in the time test. They are the practical assembling of good, wholesome ideas by experienced designers into motors that will do all that is claimed for them and stand up to their work. We are not claiming control of the designs or origination of them in their entirety. An examination of details will, however, satisfy anyone that we have undoubtedly done our share in bringing this power to a state of usefulness. We feel that we are giving more actual horse power to the propeller wheel for the size, space occupied, weight, labor, original cost and for repairs than any other maker."

The Wm. S. Haines Co., Eighteenth and Hamilton streets, Philadelphia, sends out some well-written advertisements regarding its steam specialties. One of its circular letters dealing with the Hanover oil filter is as follows: "The Hanover filter, like Prince Henry, has made friends wherever it has appeared, but unlike his highness, it is American and is in America to stay. Our booklet X4, which may be had for the asking, explains just why and where the Hanover was built; why it filters so perfectly as to make those owning one or more pass the oil from their original packages through the filter and not take it directly from the package. Possibly the filter you have is not in use because it is so dirty and it is such a nasty task to clean it. You engineer does not tell you. He thinks the next bought would be just as bad. He does not know the Hanover. It can be cleaned in three minutes without soiling his hands, but he does not have to clean it oftener than once in six months, maybe only once a year, and then new filtering material only costs about 25 cents."

CHAS. E. & W. F. PECK

ESTABLISHED 1870

58 William Street, NEW YORK CITY.

Royal Insurance Building, CHICAGO, ILL.

C. T. BOWRING & CO., Limited

5 and 6 Billiter Ave., LONDON, E. C., ENGLAND,

and at LLOYDS, London.

Insurance Brokers

As brokers we represent ONLY THE ASSURED. Our clients being the VESSEL OWNERS, we refuse to represent insurance companies. We place insurances in the most advantageous market at the best procurable rates and terms. We leave it to the managers and general agents of insurance companies to protect the interests of their companies, maintaining that it is impossible for us to devote ourselves to the interest of both the owners and the insurance companies at the same time.

Average Adjusting Department

Williamson Building, Cleveland, Ohio.

SOUND SIGNALS.

In a paper on sound signals, read recently before the British Society of Arts, E. Price Edwards gave some account of the experiments carried on last year by a special committee of Trinity house at the fog signal station on St. Catherine's point in the isle of Wight. The instrumental trials were largely devoted to comparisons of efficiency between the siren principle and the real principle of producing sounds. The trial of a new form of 7-in. disk siren with a very low note gave some interesting results. On one occasion, in fine, clear weather with a light easterly wind, it was audible at a distance of over 20 miles, while the sounds of the higher-pitched cylinder sirens were lost at half the distance. But on another day, when the force of the wind was high and the sea was rough, the low-pitched note was at a disadvantage and was lost at 1¼ miles. The reed horn as now developed must be regarded as inferior to the siren as a sound producer, yet the committee thought it must be admitted that it had its advantages in situations where a sound signal of small range would be serviceable, or where there was no space sufficient for the machinery necessary for sirens. The lecturer went on to discuss the effect of certain atmospheric influences, such as wind and fog, on the propagation of sound and mentioned the curious "silent areas" which were noticed on several occasions during the experiments, the sounds beginning to die away at a

distance of about a mile from the siren or horn until they were very faint, or perhaps inaudible, and then recovering their strength when the 3-mile line had been passed.

Fairplay of London says: "An interesting demonstration of the Clayton fire preventing and extinguishing system was given at Liverpool recently on board the German ship *Wilhelmine*, bound for the west coast of America with North Wales coal. This vessel had been fitted with a Clayton machine, and after the coal had been loaded, the holds were charged with sulphur dioxide gas of a sufficient percentage to prevent any possibility of fire from spontaneous combustion or otherwise. A number of prominent ship owners and others interested in the Mersey coal export trade were present. It is stated that the hull risk on this vessel on the round voyage has been placed at premiums less than those which have hitherto been charged on these voyages (with coal out)."

Early in May a direct line of steamers will begin running between Montreal and Rotterdam. It will consist of four vessels, the *Rodney*, *Tiger*, *Langsford* and *Ceylon*. The steamers are first-class and will be run by the Canadian Forwarding & Exporting Co.

CRANE FITTINGS

IN BRASS OR IRON

OUR FACILITIES FOR MAKING FITTINGS ARE UNEQUALED BY ANY OTHER FIRM OR CORPORATION, AND WE CLAIM NOT ONLY TO MAKE THE LARGEST NUMBER AND VARIETY, BUT ALSO TO CARRY THE LARGEST STOCK.

ALL CRANE FITTINGS ARE MARKED WITH A "C" AND ARE THREADED TO A UNIFORM GAUGE.

WRITE FOR POCKET CATALOGUE

CRANE CO.

CHICAGO

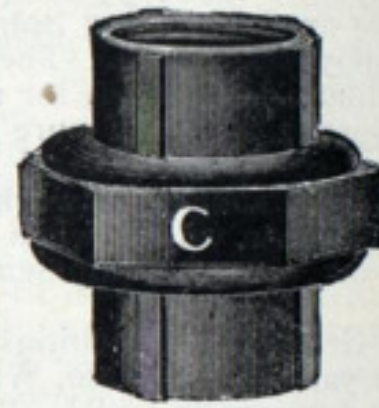
ESTABLISHED 1855

NEW YORK
PHILADELPHIA
CINCINNATI
KANSAS CITY
SIOUX CITY
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DULUTH
ST. PAUL
ST. LOUIS
MINNEAPOLIS
LOS ANGELES
SAN FRANCISCO
PORTLAND, ORE.



ELBOW



UNION

V. WARRING N.Y.



PERFECT
HOMOGENEITY

NON-CORROSIVENESS

HIGH TENSILE AND
TORSIONAL STRENGTH

EXTREME
TOUGHNESS

The *Cardinal Points* of
"BENEDICT-NICKEL"

are:

Non-Corrosiveness
Extreme Toughness
Perfect Homogeneousness
High Tensile and Torsional
Strength

These qualities make "Benedict-Nickel" peculiarly adapted for condenser tubes, and for every other purpose where highly non-corrosive tubing is required.

These are the best tubes for condensers ever devised.

They positively resist electrolysis.

They have steadily gained in favor with leading engineers and high naval authorities *because they do exactly what we claim for them.*

Their manufacture has long since passed the experimental stage.

Their superiority over copper and brass tubes has been demonstrated by *actual use.*

The basis of the high non-corrosiveness of "Benedict-Nickel" is its inert nature due to the combining of nickel with copper. The metal contains no zinc nor any other weakening metal. It is perfectly homogeneous.

The tubes are hot-rolled from solid cylindrical billets, not cast on a core, and given a twist formation like that of a gun barrel. Hence their great tensile and torsional strength.

We publish a "Treatise on Electrolysis of Condenser Tubes," which gives the full scientific reasons for the superiority of "Benedict-Nickel." Send for it.

We sell **Tobin Bronze** at manufacturers' prices.

BENEDICT & BURNHAM MFG. CO.,

Mills and Main Office, Waterbury, Conn.

New York, 253 Broadway.

Boston, 172 High Street.

NAVY COALING RECORD BROKEN.

The cruiser Olympia was recently coaled at Tompkinsville by a device which is the invention of Naval Constructor William J. Baxter and is a modification of the trolley arrangement employed in Boston harbor. It is reported that the Olympia broke the navy's coaling records, taking aboard in one day more than 600 tons, her full bunker capacity being 1,169 tons. One of the advantages of the system is that the lighter from which the coal is taken may be successfully kept from off the ship, and injury to each avoided. The coal is first put in bags, holding approximately 800 lbs. each, hoisted aboard and then stowed with comparatively little handling. The problem of rapid coaling is one which bears greatly upon ship construction. In the case of many ships in the United States navy rapid coaling, that is, extremely rapid stowing, would be out of the question so far as some of the bunkers were concerned. In order to render a disabled ship buoyant, it was thought necessary that she be divided into a great number of water-tight compartments. It has now been found that the number was far too great, that so many bulkheads interfered with handiness in various ways, particularly with getting coal in and out of bunkers. More than once it was found that certain bunkers could not be directly drawn upon after being filled, but that it was necessary to move the coal to another bunker offering better facilities for supplying the fire room. The result of this is that in vessels of the Virginia class and the California class the compartments are much larger and, therefore, less in number. The apertures for receiving the coal have been made larger also, so that the navy now has the opportunity to equal or exceed the coaling records made by British war ships. They have taken aboard, from a wharf, as much as 200 tons per hour. The Kentucky's best record is 186 tons per hour, and this under exceptional conditions. In the matter of coaling at sea, the best the United States navy has done is forty tons per hour, accomplished by the Massachusetts. This is considered good speed. Capt. Caspar F. Goodrich has done a great deal toward bringing about a new order of things in the matter of coaling ships. He agitated it when he had command of the Iowa about two years ago and recommended the passage of the order requiring the presence of all officers and men aboard their ship while it was undergoing coaling. This makes an evolution of the coaling process and familiarizes the ship's company with it. Now, such ships as are not often coaled there is a coaling drill every quarter. The Olympia is the only ship of the navy fitted with the Baxter device, but when the Newark, now being overhauled, shall have been refitted, the service will be part of her equipment. The apparatus has the added advantage of being taken down readily for storage. It may be operated by steam or electricity.

EXPERIMENTAL TANK FOR MICHIGAN UNIVERSITY.

The department of naval architecture and marine engineering in the university of Michigan will soon be one of the best equipped schools of this kind in this country. Owing to the great increase in number of students in engineering, the regents of the university have decided to erect a new building which will be devoted exclusively to the technical branches of engineering. Besides the usual class, drawing and model rooms, it will contain large laboratories for civil, mechanical, electrical and marine engineering. The last will consist of an experimental tank 300 ft. long by 22 ft. broad and 10 feet deep. The models to be tested will be from 12 to 14 ft. in length. In connection with the tank there will also be a workshop containing machines for making models of ships and propellers. The tank will prove of great value to the students as, apart from experiments relating to resistance and propulsion, many others can be investigated. This department is under the direction of Prof. Herbert C. Sadler.

COMPAGNIE GÉNÉRALE TRANSATLANTIQUE

FRENCH LINE—UNITED STATES AND EUROPEAN MAIL ROUTE.

New York to Havre-Paris in less than one week.

Steamers sail from New York every Thursday, at 10 a. m.

Company's own vestibuled train from Havre to Paris in four hours.

FLEET 70 STEAMERS.

In New York service the following gigantic Twin Screw Steamers:

"LA LORRAINE" (new)	Twin Screw	15,000 tons	22,000 H.P.
"LA SAVOIE" (new)	"	15,000 "	22,000 "
"LA TOURAINE" (modern)	"	10,000 "	12,000 "
"L'AQUITAINE" (modern)	"	10,000 "	16,000 "

Naval officers command above steamers, insuring the same strict discipline as on a man-of-war. These ships all have double bottoms and water-tight compartments, and prescribed routes are taken to avoid fogs. The above steamers contain every modern twentieth century equipment for safety, most luxurious accommodations, and the cuisine is famous. The favorite route of the elite of both continents. For rates, plans and other particulars apply to

EUGENE DE BOCANDE, General Agent for United States and Canada, 32 Broadway, New York.

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"Seaboard Steel Castings."

MANUFACTURERS OF
"THE ADMIRAL" ANCHOR.

THE LATEST AND BEST
STOCKLESS ANCHOR.

APPROVED BY LLOYD'S.

ANCHORS CAST AND TESTED ON
ORDER, OR STOCK ORDERS
PROMPTLY FILLED.

A GUARANTEE OF QUALITY.

OPEN-HEARTH STEEL CASTINGS
OF THE HIGHEST GRADE.
FACILITIES FOR CASTINGS UP TO
80,000 POUNDS WEIGHT.

MACHINE WORK AND PATTERNS
FURNISHED WHEN REQUIRED.

RAIL OR WATER DELIVERIES.

CAPACITY, 1500 TONS PER MONTH

Seaboard Steel Casting Co.,

CHESTER, PA.

"PRESERVO" WILL NOT CRACK, SCALE, FREEZE OR STICK—SEE PAGE 8.

 OWNERS, Masters and Engineers of Lake Vessels may be interested in securing photographs of their ships. Possibly an owner would like a portfolio containing photos of every ship which he owns; probably masters and engineers would like a little album containing photos of the vessels in which they have sailed—in other words a photographic story of their life work.



The Marine Review is prepared to furnish single prints of vessels or portfolios of fleets. It has a pretty thorough list of active vessels, of docks, elevators, coal and ore handling machinery, etc., some the product of its own camera and others secured through established photographic agencies.



The price at which we furnish photographs is very low.



If you are interested call or write. If you call we will show you a portfolio of prints. Perhaps there might be one among them you would like.



THE MARINE REVIEW PUBLISHING CO.,
418-419 Perry-Payne Building.

PERTH AMBOY SHIP BUILDING AND ENGINEERING CO.

The Perth Amboy Ship Building & Engineering Co., which lately acquired the plant of the late Hugh Ramsey, Perth Amboy, N. J., and which succeeds the Standard Ship Building Co., has issued the following statement to the public:

"We beg to announce the opening of the Perth Amboy Ship Building & Engineering Co. for the transaction of a general ship building business, including the building and repairing of steel and iron vessels of all descriptions, the manufacture of marine engines, gasoline and kerosene engines, marine and stationary boilers, both water-tube and cylindrical, and the building and installation of all classes of machinery. The company has acquired the plant and adjoining property of the late Hugh Ramsay, which is particularly well located and equipped and is capable of enlargement sufficient to admit of the construction of vessels up to 750 ft. in length. The plant has an excellent water front with a depth of 40 ft. of water, and the facilities for securing labor, transportation and other requisites of a first-class yard are of very favorable character. Under former management 117 vessels were successfully constructed and launched from this yard. The advantages of Perth Amboy as a manufacturing center are undoubted and are best attested by the fact that its population for the last seven years has nearly doubled and the ratio of increase for the three or four years is greater than that of any city in the vicinity of New York. The company will be pleased to give careful attention to all inquiries and correspondence in regard to the design, construction or cost of all classes of vessels or machinery."

A booklet in the way of twenty-four advance pages of catalogue has just been issued by Marine Iron Works, Station A, Chicago which they will send free on request. It contains much interesting reading matter, as also illustrations and details of the latest design of marine engines, all of value to those who may contemplate the purchase of such work. 2

WANTED—Ship and Mechanical Draftsmen. A competitive examination will be held at the Navy Yard, League Island, Pa., May 2, 1902, for the purpose of establishing an eligible register of ship and mechanical draftsmen of the different grades. Pay of ship draftsmen from \$5.04 to \$3.60 per diem. Pay of mechanical draftsmen from \$5.04 to \$3.60 per diem. For application and further information apply to Commandant, Navy Yard, League Island, Pa. April 10.

U. S. Engineer Office, 1637 Indiana Ave., Chicago, Ill., April 1, 1902. Sealed proposals for dock construction at Calumet Harbor, Ill., will be received here until 12 noon May 1, 1902, and then publicly opened. Information on application. O. H. Ernst, Lieut. Col., Engrs. April 24.

Deck Engine Wanted.

Wanted—One 6 to 10 H.P. deck engine. Forest City Wheel Barrow & Truck Works, Cleveland, O. April 3.

Naphtha Launch Wanted.

Wanted—Open light-draught naphtha launch suited to about fourteen people. Canadian vessel preferred. Address Box 25, Marine Review Pub. Co., Perry-Payne building, Cleveland. d

Tugs Wanted.

Wanted—To purchase or lease tugs of 65 to 80 ft. over all; engines 18x22 or 20x24, if low pressure; compound engines preferred. Must be in good order. Address Tugs, care Marine Review Pub. Co., Wade Bldg., Cleveland, O. tf

Air Pump and Hoisting Engine For Sale.

One air pump 31 in. diameter, 12 in. stroke, arranged for direct connection; in good condition, taken from steamer Manitou, to be replaced by a larger one. Also one hoisting engine, 12 in. cylinder, made by Chas. Elmes; never been used. Can be seen at Chicago Ship Building Co.'s works, South Chicago. Inquire of Manitou Steamship Co., Chicago. April 24.

Freight and Passenger Steamer Wanted.

Wanted—To purchase or lease a freight and passenger steamer of about 1,000 to 1,200 tons capacity on 14 ft. draught of water. James Allen. 394 Lafayette Place, Milwaukee, Wis. tf

Steamer I. M. Weston For Sale.

Length, 96.5 ft.; breadth, 18 ft.; depth, 7.6 ft.; 95 tons. In first-class condition. E. J. Glackin, 363 So. Morgan street, Chicago. tf

U. S. Engineer office, 428 Custom House, St. Louis, Mo., March 15, 1902. Sealed proposals, in duplicate, for building and installing two refrigerating plants will be received here until 12 noon, April 14, 1902, and then publicly opened. Information furnished on application. Thos. L. Casey, Major, Engrs. April 10.

BELLEVILLE GENERATORS

Grand Prix 1889
Originated 1849

Hors Concours 1900
Latest Patents 1902

Number of Nautical Miles made each year by Steamships of the Messageries Maritimes Co., Provided with Belleville Generators—Since their Adoption in the Service.

Year.	Australien	Polynésien	Armand Béhic	Ville de la Ciotat	Ernest Simons	Chili	Cordillère	Laos	Indus	Tonkin	Annam	Atlantique
1890.....	67,728	2,460										
1891.....	68,247	68,331	204									
1892.....	68,247	68,403	69,822	23,259								
1893.....	68,379	68,343	68,286	68,247								
1894.....	68,439	68,367	68,574	68,439	37,701							
1895.....	68,673	68,766	68,739	68,808	40,887	28,713						
1896.....	69,534	92,718	69,696	69,549	62,205	63,153	40,716					
1897.....	68,250	69,606	92,736	69,555	62,235	76,110	63,357	43,146				
1898.....	70,938	69,534	69,552	69,597	62,526	63,240	63,240	62,553	63,954	22,707		
1899.....	69,534	69,615	67,431	90,405	60,246	62,778	62,868	52,344	54,855	44,007	22,884	
1900.....	69,534	67,494	69,744	69,564	61,719	62,382	62,502	51,471	53,373	62,016	63,066	52,140
1901.....	44,220	69,627	69,594	66,948	51,057	62,460	62,490	61,743	62,688	43,866	62,466	63,126
Total.....	801,723	783,264	714,378	664,371	438,576	418,836	355,173	271,257	234,870	172,596	148,416	115,266

ATELIERS ET CHANTIERS DE L'ERMITAGE, À ST. DENIS (SEINE), FRANCE.

WORKS AND YARDS OF L'ERMITAGE AT ST. DENIS (SEINE), FRANCE.

TELEGRAPHIC ADDRESS: BELLEVILLE, SAINT-DENIS-SUR-SEINE.